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... THE ...
Twentieth Century
CREAMERY

How Centralization and Pasteurization
Will solve the Creamery Problem

—BY—

S. M. BARRE

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1903

TO OUR FRIENDS AND PATRONS.

We have much pleasure in offering you the accompanying pamphlet as a small token of our appreciation of the unfailing kindness and encouragement given to the Winnipeg Creamery and Produce Company, Limited, of which I am the manager.

Whilst not making any literary pretensions for these pages, I may be pardoned for stating that they contain in the most condensed form possible, the results of many years of hard work and careful study of the subject therein treated; and it is my sincere wish that they may prove of special help and benefit to the farmers whose interests are so vitally bound up with the Dairying Industry of the country.

There are still many problems to solve, and difficulties and obstacles to overcome, and I would remind you that it is only by strong, united effort that the desired results can be attained.

Let me add, in conclusion, that we shall continue to look to you in the future, as we have done in the past, for your hearty co-operation in fostering and building up an industry which is rapidly assuming its just proportions, and which, under more favorable conditions, will ere long rank as one of the greatest factors in the industrial life of Canada.

Faithfully yours,

THE WINNIPEG CREAMERY AND PRODUCE CO.

per S. M. BARRE, Manager.

The 20th Century Creamery

(MANITOBA SPECIAL EDITION)

PART I

Solving the Creamery Problem

THE MANITOBA CREAMERY INDUSTRY.

ITS PRESENT CONDITION.

After fifteen years of creamery work, it would perhaps be wise to size up the situation, examine what little has been accomplished, in what way the work was done, study what difficulties we have to face, look closely into the different creamery systems, and push the one best adapted to our conditions. In this way, we hope to give our creamery industry an intelligent and effective guidance.

Let us start from the beginning :—

In 1886 we had 2 local creameries making	2,400 lbs. butter,	Each.
In 1891 we had 11 local creameries making	200,000 lbs. butter,	12,000
In 1901 we had 18 local creameries making	650,000 lbs. butter,	19,000
In 1901 we had 3 central creameries making	850,000 lbs. butter.	34,000

The central creameries did not interfere with the local creameries' cream supply. They operated in localities where no creamery existed. Out of 36 local creameries established in the province in 15 years, (to 1901) only 13 re-opened their doors this spring, 23 having remained closed, or gone out of existence. Five were closed, or had gone out of existence during the season 1901. Three new local creameries were organized this spring (1902), and one of them is already closed

Although a few of our local creameries are doing excellent work the above figures show their growth has been very slow, and that great waste of energy is being made to increase their number. The above figures also show that in reaching a large number of localities where local creameries did not exist, the central creameries did excellent work for the province.

Over one-half of all the creamery butter was made in central creameries in 1901. The total increase of our make of creamery butter in 10 years is 1,300,000 lbs., or 130,000 lbs. a year. The local creameries show an increase of 450,000 lbs. of butter in 10 years, or 45,000 lbs. per year, whilst central creameries show an increase of 850,000 lbs. in five years, or 170,000 lbs. a year. Thus it can be seen that three central creameries have accomplished more progress in five years than 36 local creameries in 15 years.

We produce about 3,000,000 lbs. of dairy butter, of which one-half finds its way to the outside markets. We produce about 1,500,000 lbs. of creamery butter, about one-third of which finds its way to England. Our cheese industry will not grow to any extent for many years because, 1st, this is a stock raising country; and, 2nd, the present conditions will not allow milk transportation, except in very few localities. We lose every year through improper handling of our butter, on 1,500,000 lbs. dairy butter, about 4c per lb., \$60,000; on 500,000 lbs. creamery butter (shipped to England), 2c per lb., \$10,000. Total, \$75,000. These losses will grow as the dairy industry grows, unless relief comes.

We have already stated that three central creameries had accomplished more progress in five years than 36 local creameries in 15 years. Why should it be so?

Because we stand here under special conditions with regard to milk and cream transportation, and with regard to our shipping. No such conditions exist elsewhere in Canada, and unless we adopt special means to meet these special conditions, we can only expect failure. We have a problem of our own to work out, and two of the most important factors absolutely necessary to its solution are

CENTRALIZATION AND PASTEURIZATION.

Before going into the subject of Centralization, etc., I shall point out a great obstacle to Manitoba dairy progress, and that is the present cream transportation rates.

PRESENT MANITOBA RATES COMPARED WITH THOSE OF ONTARIO AND QUEBEC, AND RATES IN FORCE IN THE UNITED STATES.

CONDITIONS IN ONTARIO AND QUEBEC.

Ontario and Quebec are well populated, and largely engaged in dairy work. They have spent large sums of money in establishing what are known as local creameries. I have no hesitation in saying that their system of local creameries represents to-day an immense waste of energy which might be used to better advantage. There is no doubt that local creameries will make room for Centralization.

It is a well known fact that hardly any milk or cream is shipped by rail in Ontario and Quebec for the purpose of being manufactured into butter.

The two largest creameries in Ontario are at Renfrew and St. Mary's. The latter does not receive any cream worth speaking of by rail, while the extreme limit of cream shipping to Renfrew is 50 miles.

I very much doubt if any of the Quebec creameries receive cream from a distance of over 25 miles.

All the above mentioned creameries receive milk, and some operate skimming stations, others receive a small quantity of farm separator cream.

In Quebec, hand separator cream is now received in a few of them by rail.

It should also be borne in mind that both provinces are much nearer to their shipping port than we are. So, all the milk shipped in Ontario and Quebec is for consumption in cities, and nearly all the cream shipped by rail is used as a luxury.

In spite of the above facts, the Ontario and Quebec farmers enjoy the privilege of shipping milk and cream at the following rates.

	4 gals.	8 gals.	16 gals.
40 miles and under	8c	15c	30c
Over 40 miles to 150 miles	11	20	40

CONDITIONS IN THE UNITED STATES.

Every state in the Union where dairying is carried on to a large extent, is densely populated.

Each of these States depends to a great extent on local markets and does not rely on any export trade for the sale of its goods. In the Eastern and Western dairy States, the system mostly in vogue is the one requiring the milk to be brought to the creameries. Only a limited number of central creameries are dependent on cream shipped by rail from farmers. On the other hand, an immense milk and sweet cream trade has been developed to supply the large cities of the Union. For this purpose, milk is shipped 500 miles, and, to my knowledge, cream is shipped 300 miles.

In many States, the railways are well equipped for this special trade. Special iced cars are used, and every facility is afforded to the shipper for convenience and security. There you find refrigerator cars attached to express trains.

It stands to reason that their milk and cream rates, although much lower than ours, are not intended for milk or cream to be used for the purpose of manufacture into butter, but to be consumed in nature and used as a luxury.

CONDITIONS IN MANITOBA.

The population is sparse, and spread over a large area. The creameries are few and widely scattered. In certain sections none exist for hundreds of miles. Under present conditions, we consider the establishment of local creameries a waste of time and energy. In winter, the local creameries are closed, and from many remote parts of the province, cream must be shipped from distances of 300 to 500 miles to Winnipeg. Past experience proves that nearly 50 per cent. of the cream shipped to Winnipeg comes from points far beyond 100 miles.

Manitoba stands under specially unfavorable conditions with regard to shipping, and therefore requires centralization for the solution of its own creamery problem. No similar conditions exist outside of Manitoba and the Northwest Territories.

For the above mentioned reasons, long distance shipping and low flat rates are imperative.

THE FLAT AND DISTANCE RATES.

THE FLAT RATES.

The distance rate for carrying material for manufacturing purposes should now be a thing of the past. In this age of keen industrial competition, it has become necessary to have low flat rates on all raw material, to open free competition between all those engaged in the dairying industry. There should be no barrier of protection raised in the shape of distance rates. It is a well known fact that the flat rate on cream, which Manitoba farmers have enjoyed during

five years, has been the source of the greatest progress during a quarter of a century. It is the only way by which we can secure centralization, which is so absolutely necessary to the success of the Manitoba creamery industry.

THE DISTANCE RATE.

The resumption of the high distance cream rate in Manitoba has proved to be the worst drawback to our creamery industry in fifteen years, as the following facts and figures will show :—

During five years Manitoba farmers have had the advantage of shipping cream for butter making purposes at the rate of 20 cents per can for 150 miles, and 25 cents per can for 250 miles.

Whilst we appreciate the value of such privileges, it is well to inquire into the extent of the concession received from the Transportation Companies, so as to give them the full benefit of our appreciation. We find that Transportation Companies have for years carried, and do now carry, milk in Ontario and Quebec in baggage cars at the following rates :—

	4 gals.	8 gals.	16 gals.
40 miles and under	8c	15c	30c
Over 40 to 150 miles	11	20	40

So it appears that in the case of the 150 mile rate the Companies carried here 10 gallon cans at the rate of 8 gallon cans now in force in Ontario and Quebec. They have assuredly made an appreciable concession in carrying cream 250 miles at the rate of 25c per can, and we are pleased to give them full credit of the value of these two concessions.

But, we are sorry to say, on April 1st, 1902, the farmers of Manitoba lost that privilege, and the following schedule of rates was issued :—

"DOMINION EXPRESS COMPANY.

"Office of the Superintendent,

Winnipeg, Man., April 1, 1902.

"(Schedule No. 1).

"To Agents :—

"Effective May 1st, 1902, the following rates will apply on milk and cream between all points, viz:—

	5 Gall.	8 Gall.	10 Gall.
25 miles and under	15c	20c	25c
Over 25 miles to 50	16	21	26c
Over 50 miles to 75	21	26	30
Over 75 miles to 100	27	32	36
Over 100 miles to 150	39	44	48

"The above rates include free return of the empty cans to point of shipment. Empty cans must bear only one address, plainly marked. THESE RATES TO APPLY ON MILK AND CREAM SHIPPED IN ORDINARY TIN CANS. WHEN SHIPPED IN PATENT

CANS, OR WHERE ICE IS USED, THE REGULAR PRODUCE RATE WILL APPLY. No drayage service to be performed at either end. Cans to be loaded or unloaded by shipper or consignees.

"Cans of a capacity for which no rates are quoted will be charged the next highest rate. Two five gallon cans will not be carried at the charge for one ten gallon can.

"Commencing May 1st, cans will be way-billed, discontinuing the use of tickets. Agents will return all unused tickets on May 1st. Empty cans will not be way-billed, and owners will be required to sign a release on form 192, releasing this Company from all claim for loss or damage to empty cans carried free. Form No. 192 may be had on application to Supply Department, Toronto.

"Notice of the change in rates must be given to all parties concerned, at the earliest possible moment.

"Yours truly,

"G. FORD, Superintendent."

"This limits shipping to 150 miles.

Considering schedule of rates No. 1, we note that they are about 66 per cent. higher than the flat rates previously in force.

"Winnipeg, Man., April 16th, 1902.

"The Winnipeg Creamery & Produce Co.,

"Winnipeg, Man.

"Dear Sirs :—Replying to your letter of April 9th, regarding proposed new rates on cream and milk.

"With a view to assisting you over this season, we have decided to put in a reduced scale of rates, to stand until 31st December next, after which the schedule of which you have already been advised will be put into effect.

"Following are the rates for this year :—

	5 Gal.	8 Gal.	10 Gal.
25 miles and under	15c	20c	20c
Over 25 miles to 50 miles	16	20	25
Over 50 miles to 75 miles	21	26	30
Over 75 miles to 100 miles	27	30	30

"No higher rates will be charged on five or ten gallon cans. Under the new tariff agents will bill all cans, and assist in loading the cream and unloading the empty cans.

"I trust these rates will be satisfactory.

"Yours truly,

"G. FORD, Superintendent."

Here an attempt was made to limit cream shipping to 100 miles. The United States farmer ships his cream 500 miles. The Ontario and Quebec farmer can ship his milk and cream 150 miles, etc., but cream shipping in Manitoba is limited to 100 miles.

After further protest, the limit was extended, and a third schedule of rates was issued as follows:—

"DOMINION EXPRESS COMPANY.

"Office of the Superintendent,

"Winnipeg, Man., April 22, 1902.

"To Agents:—

"MILK AND CREAM RATES.

"In addition to 'Special' issued April 16th.

Over 100 to 125 miles... .. 35 cents.

Over 125 to 150 miles... .. 40 cents.

Over 150 miles, 5 cents in addition for each 25 miles.

"These rates, and rates issued April 16th, to expire December 31, 1902.

"Please advise all concerned.

"Yours truly,

"G. FORD, Superintendent."

The cream rates now stand until Jan. 1st, 1903, as follows:—

25 miles and under				5 Gall.	8 Gall.	10 Gall.
Over	25 miles to	50 miles				
" 50	" 75	"		15 3	20 2.5	20 2
" 75	" 100	"		16 3.2	20 2.5	25 2.5
" 100	" 125	"		21 4.2	26 3.2	30 3
" 125	" 150	"		27 5.4	30 3.7	30 3
" 150	" 175	"		35 7	35 4.4	35 3.5
" 175	" 200	"		40 8	40 5	40 4
" 200	" 225	"		50 10	45 5	45 4.5
" 225	" 250	"		55 11	50 6.2	50 5
" 250	" 275	"		60 12	60 7.3	60 6
" 275	" 300	"		65 13	65 8.1	65 6.5
" 300	" 325	"		70 14	70 8.7	70 7
" 325	" 350	"		75 15	75 9.3	75 7.5
" 350	" 375	"		80 16	80 10	80 8
" 375	" 400	"		85 17	85 10.6	85 8.5
" 400	" 425	"		90 18	90 11.1	90 9
" 425	" 450	"		95 19	95 12	95 9.5
" 450	" 475	"		100 20	100 12.3	100 10
" 475	" 500	"		105 21	105 13.1	105 10.5
				110 22	110 13.7	110 11

Average amount per can 62 cts. 62 2-5 cts. 63 1/4 cts.

The second column under 5, 8 and 10 gallons respectively in the above table represents the rate per gallon.

The following tables and the Appendix at the end of this part let give you an exact idea of the cost of cream transportation cost of carrying butter outside of the province.

Statement showing cost of Transportation on each pound of Butter shipped from the following Stations over 100 miles distant in 5, 8 and 10 gallon cans respectively. Based on 25 lbs. Butter to 10 gallon

FROM	5 gal. can cents	8 gal. can. cents	10 gal. can cents	FROM	5 gal. cts.	8 gal. cts.	10 gal. cts.
Arden	24-5	18-4	12-5	Ogilvie	24-5	18-4	12-5
Binscarth	42-5	28-4	2	Pipestone	4	21-2	2
Baldur	81-5	2	18-5	Plumas	24-5	18-4	12-5
Belmont	81-5	2	18-5	Renton	4	21-2	2
Birtle	4	21-2	2	Somerset	24-5	18-4	12-5
Boissevain	4	21-2	2	Snowflake	81-5	2	18-5
Churchbridge	44-5	8	22-5	Solsgirth	4	21-2	2
Carroll	81-5	2	18-5	Sinclair	4	21-2	2
Douglas	24-5	18-4	12-5	Stockton	24-5	18-4	12-5
Deleau	88-5	21-4	14-5	Shoal Lake	88-5	21-4	14-5
Findlay	4	21-2	2	Wawanessa	88-5	21-4	14-5
Foxwarren	4	21-2	2	Wauchope	44-5	8	22-5
Gruber	42-5	28-4	21-5				
Glenella	24-5	18-4	12-5	Average	81-2	21-5	18-5
Glenboro	24-5	18-4	12-5				
Greenway	81-5	2	18-5	Average 21-2 cents			
Hilton	88-5	21-4	14-5				
Hartney	88-5	21-4	14-5				
Harrowby	42-5	28-4	21-5				
Kelso	88-5	21-4	2				
Laurier	81-5	2	18-5				
Lariviere	24-5	18-4	12-5				
Langenburg	44-5	8	22-5				
Makinak	88-5	21-4	14-5				
Millwood	42-5	28-4	21-5				
Manitou	24-5	18-4	12-5				
Methven	81-5	2	18-5				
Mariapolis	24-5	18-4	12-5				
Manor	44-5	8	22-5				
McCreary	81-5	2	18-5				
Neepawa	24-5	18-4	12-5				
Newdale	88-5	21-4	14-5				
Ninette	88-5	21-4	14-5				
Nesbitt	81-5	2	18-5				
Oak Lake	88-5	21-4	14-5				
	1244-5	78	613-5				

Cost of Transportation on Cream added to Transportation on Butter
when shipped outside the Province.

5 GALLON CANS.

10 GALLON CANS.

STATIONS	Transportation on Cream	Transportation of Cream Added to Transportation of Butter.		Transportation of Cream	Transportation of Cream Added to Transportation of Butter.	
		From (in Cents)	To (in Cts.)		From (in Cents)	To (in Cts.)
Arden	2 80	4 80	4 80	1 40	2 90	8 40
Baldur	3 20	4 70	5 20	1 80	3 10	8 60
Binscarth	4 40	5 90	6 40	2 00	3 50	4 00
Foxwarren	4 00	5 50	6 00	2 20	3 70	4 20
Gladstone	2 16	3 66	4 16	1 20	2 70	3 20
Glenboro	2 80	4 80	4 80	1 40	2 90	3 40
Langenburg	4 80	6 80	6 80	2 40	3 80	4 40
Manitou	2 80	4 80	4 80	1 40	2 90	3 40
Rapid City	3 80	5 10	4 60	1 80	3 30	3 80
Solegirth	4 00	5 50	6 00	2 00	3 50	4 00
Wauchope	4 80	6 80	6 80	2 20	3 90	4 40
Wawanessa	3 80	5 10	5 60	1 80	3 80	3 80

NOTE:—The foregoing Table shows that the present cost of Cream Transportation, added to the cost of carrying Butter outside of the Province, is as follows:

In 5 gallon cans 22 per cent to 40 per cent average 31 per cent. on market price of butter.

In 10 gallon cans 17 per cent. to 26 per cent. average 22 per cent. on market price of butter.

Market price of Butter in summer taken at 16½ cents per lb.

The cost of Cream Transportation is based on:—

“ “ Butter “ 1-10 gallon can—25 lbs. butter.
“ “ “ “ in car load lots to Montreal including icing \$1.40 per 100 lbs.
“ “ “ “ in car load lots to the Pacific Coast, \$1.60 per 100 lbs.

“ “ “ “ Average 1.50 “ “
“ “ “ “ in fractions of car load lots to the Pacific Coast 2.00 “ “

Please note that the New York Central and Hudson River road carry milk or cream in refrigerator cars, 440 miles at the rate of 50 cents for a 10 gallon can.

It is also well to remember that cream for butter making is carried in refrigerator cars from 100 to 150 miles to a Montreal creamery at the rate of \$20.00 per car, or about 10 cents per 100 lbs.

We must also note that in the G.T.R. Western division, imperial measure is allowed at the same rate as wine measure.

SUMMING UP.

In summing up the question of cream transportation we find

1. That in the United States milk or cream is carried 500 miles.
2. That on the Grand Trunk System, (Western Division, U.S.R.R.) imperial measure is allowed at the same rate as wine measure.
3. That every possible restriction has been placed on cream shipping, particularly beyond a distance of 100 miles.
 - a. An attempt has been made to limit the shipping of cream to 100 miles. (See Ford's circular of April 16th, 1902.)
 - b. Exceedingly high rates have been applied, much higher than those in force in other parts of Canada, or in the United States and America.
 - c. Cream shipping in iced or patent cans has been prohibited, thus preventing the due care of cream in transit.
 - d. Contrary to general practice, no special provision has been made for 5 or 8 gallon cans beyond a distance of 100 miles. It costs just as much to ship 5 gallons as 10 gallons beyond that distance.
4. That the present express service is not only extremely high, but also very inefficient, and most unsuitable for the purpose.
 - a. By inefficient service, we mean that empty cans are returned anywhere and everywhere except at the right place. They are often carried past the right station to some place where they lie for weeks and months. In other cases the empties are not unloaded at points of destination, and are returned as empties to Winnipeg. This has been the cause of great annoyance, delay, and extra labor to cream shippers.

b. We do not lay the blame on the Company's employees for such inefficient work, because the traffic has grown so large (about 400 to 450 cans per day in the busy season), and there is so much work of all kinds to be done in express cars, that the Company cannot properly and satisfactorily attend to the requirements of cream transportation.

c. Any one knows that carrying cream in hot cars during the summer months will not improve the quality of butter.

5. If such exorbitant rates are allowed to remain in force, and such inefficient and unsuitable service is allowed to continue, they will have the following disastrous effects on the creamery industry of the province:—

a. They will discourage cream shipping in general, and small shippers in particular.

b. They will, in a measure, prevent the improvement of the quality of our butter, farmers keeping a limited number of cows, and being unable to ship in small cans without paying a double price, would keep the cream too long for good butter making.

c. They will restrict long distance shipping, and prevent a large number of farmers from shipping to the most profitable markets.

d. They will discourage winter creamery work. Farmers from Plumas, McCreary, Makinak, Arden, Foxwarren, Binscarth, Millwood, Langenberg, and all points north west of Portage la Prairie, must ship their cream to Winnipeg, in spite of a distance of 236 miles to Langenburg.

e. They will, in a great measure, prevent the use of special cars, which are absolutely necessary for suitable transportation. Nearly 50 per cent. of the cream shipped to Winnipeg comes from distances far beyond 100 miles.

f. They will increase the cost of butter production, check the power of competition, and place Manitoba in an unfit condition to cope with other countries and other provinces.

g. They will favor the erection of local creameries, and saddle upon Manitoba a creamery system entirely out of date, and unsuitable to our special conditions, in fact, a system which we must by all means avoid.

6. Considering the question of rates from this standpoint alone, namely, that in Ontario, Quebec, and some of the Eastern and Western States, cream is carried almost solely to be used as a luxury, and whereas considering that the cream in Manitoba is carried for the purpose of being manufactured into butter, we must come to the conclusion that Manitoba rates are exceedingly high, whilst Manitoba farmers are entitled to much lower rates than the farmers of Ontario, Quebec, and the United States, under present conditions, considering that on many United States R.R. the cream is carried at a low rate

in refrigerator cars attached to express trains, and that the Manitoba cream is carried in ordinary hot express cars, we find that the present rates are exorbitant.

7. Considering the large and increasing quantities of cream available for shipping in Manitoba, and considering the high rates on butter shipped outside of the Province, we consider that cream should be carried at almost the balance of the through rates on butter shipped to Montreal, or to the Pacific Coast.

8. Considering that the present cost of cream transportation added to the cost of carrying butter outside of the Province, WHICH IN MANY CASES, AMOUNT TO FROM TWENTY-FIVE TO FORTY PER CENT. OF THE TOTAL VALUE OF THE BUTTER.

9. We feel that the present rates have been inaugurated by the Transportation Companies, not from any desire to lay undue burdens upon the public, but rather from a want of a thorough knowledge of the facts, and of the effect such rates will have upon the dairy industry in general, and we hope that should the matter be properly placed before them, all the points herein contained would receive immediate and careful consideration, because it is utterly impossible for Manitoba dairying to grow and prosper under any such conditions.

TO OUR WESTERN REPRESENTATIVES.

It is a well known fact that the Dominion Government has contributed towards fostering the Dairy Industry of Manitoba for some years, although such help has been extended under different forms in some of the other provinces. A contribution of \$2,000 per annum has been granted to the Quebec Dairymen's Association, and the Ontario and Quebec refrigerator car service has been and is still subsidized by the Federal Government. It is possible that we in the West have received no assistance because we have not asked for it.

The present transportation rates show that we are in great need of assistance, and we trust that our Western representatives will endeavor to secure for and obtain similar assistance to that granted in some other provinces.

Solving the Creamery Problem

HOW TO AVOID ERRORS AND WASTE OF ENERGY.

We must change our policy so as to avoid errors and waste of energy. Dairymen deeply regret the existence of numerous small factories in Canada. They are a great impediment to progress. They produce an irregular, and, in many cases, a poor quality of goods, and prevent rapid shipment to distant markets. They, as a rule, represent a large waste of capital, labor and energy, which should be used to better advantage. They decrease the farmers' revenue by keeping up the expense of butter-making, and preventing the rapid improvement of the quality of butter. With this knowledge of the facts, in this age of progress, why should the Manitoban dairy farmer reduce his income for the sole purpose of supporting and enlarging a method of manufacturing and handling dairy produce, which is entirely out of date, unsuitable to our conditions, and fast disappearing in the most advanced countries of the world?

If 10 or 20 years ago it was considered an advantage for 50 or 100 farmers to club together, and get their milk or cream made into factory cheese or butter, would it not be a much greater advantage if 5,000 or 10,000 farmers would club together to do the same thing?

In order to show the folly of organizing local creameries, allow me to state that the interest on the capital invested, and the wear and tear in a first-class creamery plant would pay the cost of railway transportation to a central creamery on all the cream that the average Manitoba creamery receives, so that the investment for such creameries is useless.

We have fully demonstrated that our efforts to introduce here the system of local creameries has resulted in a great waste of time and energy which might have been utilized to better advantage. We have also shown that three central creameries have accomplished more progress in five years, than 36 local creameries in 15 years. Why should it be so?

Because, as before stated, we stand here under special conditions with regard to milk and cream transportation, and with regard to our shipping. No such conditions exist elsewhere in Canada, and unless

we adopt special means to meet these conditions, we can expect a very small degree of success. We have a problem of our work out, and two of the most important factors absolutely necessary to its solution are Centralization and Pasteurization.

ADVANTAGES OF CENTRALIZATION

1. Making daily large quantities of fine, fresh butter, the central creamery can fill all orders promptly, pack the butter in all sizes and forms, best suited to please the customer, and insure immediate shipments to the best of the world's markets.
2. The central creamery being, as a rule, located in a large town, will find a ready sale for a considerable quantity of butter at a low price.
3. With a suitable cream rate it is just as cheap, and cheaper, to ship cream as to ship butter.
4. It operates winter and summer, and offers a constant and reliable market to the farmer.
5. It produces a more uniform quality of butter than in a number of small creameries.
6. It reduces the cost of manufacturing butter, and increases the returns to the farmers.
7. It is to-day a needed up-to-date institution.

The organization of local creameries was the first step toward centralization. At the time they were established, and for years afterwards, it was impossible, for want of transportation facilities, to extend the circle of centralization beyond their limits, but now the situation is entirely changed, transportation facilities are abundant, and I believe Manitoba is especially favored in that respect. Winnipeg promises to be one of the largest railway centres of this continent. We must, then, utilize railway transportation for the purpose of extending centralization as far and as wide as the limits of this province, and give the farmers the full benefit of its advantages, for, I can assure you, they need them. What is the object of our transportation companies if not to expand trade, to create and improve industries? Their interest is closely allied to ours, and we feel confident that they will do their duty in that respect. Consequently, the time has come when we must centralize as far as possible, and secure for farmers all the advantages centralization is capable of giving.

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on.

We must centralize to improve the quality of butter. The quality of butter can only be improved by the use of more suitable cream transportation methods, and by the application of the most advanced and scientific dairy practices, which may offer some difficulties in small creameries.

We must also centralize to extend the power of competition.

OUR MARKET—COMING COMPETITION.

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The British Columbia market is now largely supplied by creameries recently established in British Columbia and the West, in summer, by Oregon, California and Washington Territory in the winter. Owing to special trade conditions, the Yukon is supplied mostly with American butter. England is the only large reliable market for our surplus butter production.

Coming competition. A large number of countries have gone into butter making during the last 10 years. Denmark, Sweden, Norway, France, Germany, Belgium, and even Finland, are sending large supplies, while Russia, and Siberia particularly, is already shipping butter by the train load to the British market.

Thus, at the very time we expect a rise in prices, we experience a decrease. This is the forecast of a still keener competition. France is already feeling the pressure of competition, and its butter exports to England have decreased to some extent. Large quantities of butter are shipped from Australia, New Zealand, etc. Canada is extensively engaged in dairy work, and is preparing to increase it. Canada is almost reached the limit of her cheese production (we hope yet to increase it), and our Canadian produce exporters are advising our dairymen to turn their attention to butter-making. Manitoba can make cheese only in limited quantities, and must also turn to butter-making. We can, therefore, safely say that there will be a large increase in the butter production of all countries in the near future.

We must ship to England. She can take an immense quantity of butter, but not an unlimited amount. We can only increase our butter exports by displacing a similar quantity of butter from other countries to that market. We may therefore expect a very keen competition in the sale of butter in the near future. I do not intend to alarm you, but it is my wish that our dairymen should be armed, organized and equipped as well as those of the best dairy countries of the world, so as to meet this competition when it comes. How is this to be done? I say, by "Centralization."

OUR BUTTER MUST GO TO ENGLAND

As already stated, another new factor in Manitoba dairy is that we must ship a great deal of our butter to England. We are here nearly 5,000 miles from our market. It means that every delay in the shipment of our butter will tell against the quality and price. Hence we must save time by all possible means.

How, then, can we reasonably expect to compete in the fresh butter with countries and provinces much nearer to England than we are, if we follow old methods and have our butter made at the province in small lots? It would be absurd to expect it. The following market report may throw some light on the subject:—

"Liverpool, Aug. 1, 1900

"Butter meets with very slow inquiry at late rates. Irish butter commands first attention, the Canadian article being neglected. We quote:—Finest Siberian creamery, 86 to 94 shillings; finest Canadian creamery, 96 to 98 shillings; fancy Irish creamery, 98 to 100 shillings; Irish creamery, 102 to 112 shillings."

I am pleased to state that Canadian butter has been in good demand in England since spring, and we can boast of a wonderful increase in our butter exports this year. Why is it that during the summer the Canadian article is neglected? Irish butter commands attention, and Danish butter sells from 4 to 12 shillings more than Canadian. Is it because Irish and Danish butter are so much better than Canadian at the time they are made? Assuredly no. I have lately seen in Montreal just as fine butter as could be made anywhere in the dairy world. It is simply because Irish and Danish butter reaches the market in a fresher condition. This shows the value of proximity to a market. How can we best replace proximity if we cannot have it? How can we acquire haste and speed in shipping? How can we acquire haste and speed except by centralization?

The value of haste and speed in handling our butter is exemplified by the following recent experience of a Manitoba creamery butter shipper. The following is a Montreal report:—

"Aug. 22, 1900

"Two carloads of Manitoba butter arrived on Monday, but just as the low prices quoted, namely, 15½c to 16c, it cannot be sold at a fancy. Two cars of Manitoba dairy butter are also said to be on

way here. The creamery butter is said to have been bought at 17c to 17½c f.o.b. point of shipment, but owing to the poor condition in which it arrived, it was rejected."

These two carloads of butter were composed of lots picked up from different points of the province, and represent quite a loss to the shippers. It means that we must gather cream enough in each creamery to make and ship one or two car loads a day. That is our only road to success. It proves very conclusively that centralization is not a question of sentiment, but one of business. It is a question of success or failure to the Manitoba creamery industry, and will soon become one of necessity to every province of this Dominion.

The benefit of centralization is becoming known every day. In Vermont, we find a creamery making 25,000 pounds of butter a day. In Kansas a creamery receives cream from 18,000 patrons. In Australia creameries make butter by the million pounds. Finland has large central creameries. In St. Paul, Minnesota, we find a creamery making over two millions pounds of butter a year, and receiving cream from a distance of 350 miles. Canada is the only dairy country behind the times in that respect. The Manitoba creamery policy should, therefore, favor centralization.

WHERE SHOULD CENTRALIZATION TAKE PLACE?

Centralization should take place in Winnipeg. (1) Because it is the largest railway centre in the province. (2) Because it is the nearest and most central shipping point to our shipping port, Montreal, and butter has to go through Winnipeg, anyway. (3) Because the population of Winnipeg is rapidly growing, and the Winnipeg local market will ever be the best in the province, and farmers do get, and will ever get, a higher price by shipping their cream to Winnipeg than anywhere else.

CREAMERY SYSTEMS.

Occasionally we read in the press, or otherwise hear, that our creamery plan will make room for the power separator with skimming stations, etc., as soon as our province is more densely populated. So long as such ideas prevail, how can we expect any substantial improvement? How can we expect the farmer to take any great interest in a creamery system, when he is led to believe that it may disappear, and make room for something else at any time? It is, therefore, absolutely necessary that we should have some fixed ideas as to what the prevailing creamery system will be, before any substantial move ahead can take place.

We have in Canada two creamery systems. (1) The power separator, where milk is brought to the creamery. (2) The hand separator, or cream gathering. It happens to have been my privilege to introduce both of these systems into Canada, the cream gathering in 1878, and the power separator in 1882. The power separator is most frequently used in Quebec, in some parts of Ontario, in the Maritime Provinces and in British Columbia. The cream gathering system is the only plan possible in Manitoba and the Territories. It has for years existed in some parts of the U.S., Australia and Ontario, where it is gaining ground in spite of strong opposition. It is also finding its way into the province of Quebec. Dairymen would, no doubt, like to have an idea as to which of the two plans of creameries is likely to become the prevailing one. It will be with creameries as with all other things, the "survival of the fittest." The plan which will offer the greatest advantages to the farmers, and will prove the cheapest to operate, the best adapted to centralization, and to the production of a fine quality of butter, will, no doubt, prevail in Canada and elsewhere.

Let us examine the qualities and defects of both, and follow the evolution which is taking place in American and Canadian creamery work.

POWER SEPARATOR CREAMERIES.

The power separator creameries possess one great quality, they produce fine butter, the best Canadian butter is now made on this plan.

The disadvantages of this system are :

1. It is costly to equip and operate, and cumbersome to manage particularly with skimming stations.
2. It requires daily transportation of milk, which is far more bulky, burdensome and costly than cream transportation.
3. Milk cannot be collected over a large territory, hence the great expense caused by the multiplication of creameries or skimming stations.
4. It exposes a large quantity of milk to contamination, on the farm, and in transit.

5. It allows any impurities which may fall into the milk to soak and contaminate, until separation takes place in the creamery.

6. Through the mixed skim milk from every patron, it sometimes spreads contagious diseases among farm animals, such as pigs, calves, poultry, etc.

7. On account of its cost to equip and operate, it is not the best adapted to centralization.

8. Last, but not least, it leaves the skim milk in poor condition for feeding purposes.

The cost of building, operating, transportation of milk, and the poor quality of the skim milk are the three weak points of this system of creameries.

THE CREAM GATHERING PLAN.

The only defect of the cream gathering plan is that it does not always produce a fine quality of butter, although some butter made on that plan has proved to be as good as any.

Its advantages are :

1. With regard to economy of equipment and operation, it is, by far, the best plan in existence.
2. It reduces the cost of transportation to a minimum. Cream is less bulky than milk, and need not be taken every day to the creamery.
3. The cream can be collected over a very much larger territory than milk when delivered to one factory.
4. It is the best adapted to centralization.
5. The average cream obtained from the farm separator immediately after milking, is of a better quality than the average cream obtained in a power separator creamery.
6. It leaves the skim milk on the farm in first class condition for feeding purposes, which means a great deal to the farmer. The hand

separator skim milk, fed without artificial warming, has a value much superior to any other skim milk.

7. It prevents the spreading of contagious diseases from farm through skim milk.

Economy in equipment, operation, transportation, and the skim milk, are the strong points of the system.

EVOLUTION IN CREAMERY WORK.

THE COMING CREAMERY SYSTEM.

The cream gathering plan with deep setting, as a system of separation, was invented by Charles Fairlamb, in the United States over 25 years ago. It was introduced into Canada in 1878. The power separator creamery has replaced the old flat plan system in the United States and in Canada since 1882, but the cream gathering plan, in spite of its defects, remained. The power creamery system was unable to replace it to any great extent in many parts of the United States and in Canada. A great reaction has taken place in favor of the cream gathering plan since the advent of the hand separator, in 1890. There is no doubt that cream gathering, or hand separator creamery system, is gaining ground in the United States and other dairy countries. The power separator system is gradually disappearing to make room for it, in spite of strong opposition, it is also spreading in Ontario, Quebec and elsewhere. As already stated, it is the only power plan in Manitoba and the Territories. We must, therefore, conclude that a creamery plan, which has stood the test of time, which has held its own against all comers, and which, in spite of strong opposition, is everywhere gradually forging its way by the force of its merits, is assuredly worthy of our best attention.

Any careful observer of what has taken place in American and Canadian creamery work during the last 25 years, particularly during the last five years, must come to the conclusion that the cream gathering plan will become the prevailing system of creameries, not only in Manitoba, but everywhere.

The first stage of the creamery industry was the local creamery. The second was the central creamery, with skimming stations. The third will be the large central creamery with hand separators.

Why not, then, at once accept the inevitable, why not strive to improve it, and build upon it the foundation of perhaps the best creamery system in the world. This is the direction in which I believe we should work.

HOW TO IMPROVE THE QUALITY OF GATHERED-CREAM BUTTER.

The main defect of gathered cream butter is an objectionable flavor, developed through the souring of cream on the farm and in transit. This is what we are seeking to correct. The question of improving gathered cream butter has been one of great interest for some years. Researches have been made with that object in view, in two different ways: We have sought to correct the flavor of sour cream, first by the use of "pure cultures"; and secondly, by pasteurization. Exhaustive experiments were conducted by Profs. Farrington and Russell at Wisconsin Experimental Station, which proved conclusively that the use of pure cultures had no beneficial results on the flavor and the keeping quality of gathered cream butter. On the contrary, butter made the normal way had the best flavor and keeping qualities. The results of the same experiments led us to believe that the only field in which pasteurization of sour cream has also been attempted by a few creameries, with limited success. We stand where we did 25 years ago. In 1878, I gathered cream in cans, measured it, mixed it on the road, brought it to the creamery and churned it. This is exactly what the average gathered cream creamery does to-day, with the exception that the cream is now tested, and the hand separator is used instead of the deep setting pails.

It is a difficult matter to correct the flavor of sour cream, although I believe something could be done in that direction. In this case, as in many others, however, an ounce of prevention is worth more than 1,000 pounds of cure.

Taking it for granted that the average cream from the farm separator is of a better quality than the average cream from the power separator creamery, we have here a splendid foundation to work upon. If it were possible to preserve this cream in its purity, and deliver it sweet to the creamery, the question would be solved. We hope to accomplish this with the farm pasteurizer. With pasteurization immediately after cream separation, we destroy all bacterial germs, and with them the cause of poor flavors. We would then have sweet flavorless cream, summer and winter, and with the use of "ferments" we could control the flavor and quality of butter. Now with a suitable system of cream transportation we should be able to make first-class export butter.

REQUIREMENTS OF THE TWENTIETH CENTURY CREAMERY.

In summing up the whole dairy situation, we find that creamery work requires :

1. CENTRALIZATION.
2. PASTEURIZATION.
3. SPECIAL CARS FOR CREAM TRANSPORTATION.

It appears that Canada is behind time in that class of transportation, probably because we have not felt the want of it before present time. The American and English railways are most completely equipped in that way, and we find that Finland, where a creamery system exists, has railroad cars so well equipped that cream is brought in a half frozen condition to a central creamery. They have made provision in rates to carry small cans holding two quarts of cream.

SPECIAL FLAT RATES.

Special flat rates extending 300 miles in summer and 500 miles in winter. Transportation should not cost over 2 cents per gallon for 150 miles, 2½ cents for 250 miles, 3½ cents for 400 miles, and 4½ cents for 500 miles, for all sizes of cans.

Special rates should be obtained for cream by the carload. I am pleased to state that Geo. H. Shaw, of the Canadian Northern Railway Co., has agreed to give us low rates on the above basis for special cars for next season.

DAIRY EDUCATION ON THE FARM.

Our future educational energy should be spent in teaching farmers how to run separators and how to prepare their cream for shipment. I mean by the closing of the provincial, and the establishment of periodical dairy schools in every county, besides lecturing and practical demonstrations in nearly every public school of the province.

PART II

The Patron's Hand Book

CREAMERY WORK OF INTEREST TO FARMERS.

Some of the Creamery work is of great interest to farmers. Cream testing is, of course, of paramount importance to them. In all creameries there has always been more or less friction with the patrons with regard to the cream test, and such friction will continue to exist for some time to come. Without claiming perfection or infallibility for creameries, allow me to state that 90 per cent. of such misunderstanding is due to the want of information on the part of the cream shipper or patron with regard to skimming milk, and also with regard to the variations in the richness of cream, which in many cases, he overlooks altogether. A large number of separator users do not understand how to operate them. Probably very few know about variations in the richness of milk or cream, how such variations take place, and what should be done to prevent them as much as possible. Some churn a can of cream occasionally, and, as a rule, look upon the result of that churning as a standard by which the cream should be paid for, regardless of variations resulting from a number of causes beyond their knowledge and control, ignoring probable differences due, in some cases, to incorrect churning, temperature, incorrect weight of cream and butter, improper working of the butter, etc.

There also exist in Manitoba (hardly elsewhere) different opinions as to what is the most reliable method of testing cream.

It is therefore, my intention to point out what I believe to be the best method of testing cream, how cream varies in richness, what should be done to guard, as much as possible, against such variations; and also show that farmers could, in great measure, help us to secure themselves a more satisfactory test.

As the question of the oil test churn, and the Babcock test for cream, has for some years been the subject of considerable discussion amongst dairymen of the United States, I will place both sides of the argument before the public, in the hope that a definite opinion may be formed as to the value of both methods:—

METHOD OF TESTING CREAM.

There are two methods of testing cream. First, the oil test, and second, the Babcock method.

The oil test churn is an old method used in all creameries in the States and the Territories, except in our own. Farmers are interested to know which of the two is most accurate, and how it compares with modern creamery work.

The following gives you an idea of the value of both. In the method of testing cream, it is impossible to obtain but any of them. We always get butter fat from either the test or the Babcock method. The churn test separates the fat by motion, after which it is melted to the condition of oil. The oil is then measured according to an established representative showing an approximate amount of butter from a given quantity of butter fat. Thus 100 inches of cream testing 100 unites of butter fat are supposed to produce 100 lbs. of butter, etc.

The Babcock test separates the fat by chemical action through the use of sulphuric acid, and also by centrifugal motion. It measures the real percentage of fat contained in the cream.

The difference between the Babcock test and the oil test is that the Babcock shows the real, the exact quantity, of fat contained in the cream, whilst the churn test shows only the churnable fat, leaving in the buttermilk a variable quantity of fat, according to temperature, acidity, age of cream, etc., and the natural churnability of cream, due to breeds, feed, strippers' milk, etc.

It is a well known fact that it is almost impossible to separate cream from strippers' milk, particularly while cows are fed on fall and winter food. It is next to impossible to churn such milk in the small tubes of a test churn.

Thus it can easily be seen that it is impossible to obtain accurate results from it. This fact has been fully established by the highest scientific and practical authorities in America. We quote from Prof. Farrington's book on "Milk Testing and its Principles," published in 1897, or six years ago. On the second page of the book, in the first paragraph, we read: "While the oil test churn is capable of showing the difference between good and poor cream, it cannot, according to the investigations conducted at the Wisconsin experiment station, make strictly accurate distinctions between different grades of good and poor cream. As a result, perfect justice cannot be done to the patrons of creameries, where payments for cream delivered are made on the basis of this test."

Again, on page 150 of the same work we read: "The cream determined at gathered cream factories is now in many localities, tested by Babcock test. This has been adopted as a basis of paying for cream, in the same manner as milk is paid for at power separator creameries. It has been found to be more satisfactory to both creamer and seller than either the oil test churn or the space system, which have been used for this purpose in these parts."

The details of the application of the Babcock test to the practical work at cream gathering creameries, have been carefully investigated at the Connecticut, Maine, and the Massachusetts experimental stations, and we owe to the labors of their chemists much information concerning the present work of other systems of paying for cream gathered at creameries.

The following is the opinion of R. J. Carroll, Dairy Supt. of the Province of Victoria, Australia. He says: "As a result of lengthy experiments, in the application of the Babcock method of estimating butter values of cream, there can be no question as to which method is the more accurate and fairer to both seller and purchaser. It may be said that given a careless or dishonest operator with the test, the returns to patrons can be rendered equally unsatisfactory. That may be so, but in a review of the points to be strictly observed in manipulation of the two methods of arriving at just returns, no doubt can be raised as to the advantages possessed by the Babcock system. There is less possibility of error creeping into the estimation of butter values by the Babcock, than by the butter maker, with the oil test churn."

According to E. P. Horton, Dairy Commissioner of the State of Iowa, the use of the Babcock test for cream has been legalized by laws of that State.

SEVENTY-FIVE PER CENT. OF THE CREAMERIES IN THE UNITED STATES ARE USING THE BABCOCK TEST FOR CREAM.

THE TEST CHURN GOING OUT OF USE.

Please bear in mind that some years ago every cream gathering creamery in the United States used oil test churn for testing cream.

This way of testing cream has, in a great measure, been discarded as the following quotations and letters will show.

"Mr. S. M. Barre,

"Mgr. Winnipeg Creamery and Produce Co.,
"Winnipeg, Man.

"Dear Sir,—Replying to your inquiry of the 7th inst. w
that no information reaches us that the Babcock test for
ing abandoned in the Wisconsin creameries, and the old o
taking its place. On the contrary, our information is tha
all the current demand is for Babcock tests."

"Yours truly,

"W. D. H

We again quote from the Creamery Package Manufac
Chicago, which is the largest dairy supply house in
States, and fully in touch with what is going on in dairying

"S. M. Barre,

"236 King St., Winnipeg, Man.

"Chicago, Nov. 21st

"Dear Sir:—We have yours of the 19th, and beg leave to
ninety-nine per cent. of the creameries handling milk are us
cock test, and we think fully seventy-five per cent. of the
cream creameries are using the Babcock test.

"Yours very truly,

"Creamery Package Manufacturing Co.,

"I. R. Amack

In Professor Farrington's "Testing Milk and its Products"
lished in 1897, we read on pages 153-158:

"The same reasons which caused the churn to be replaced
methods of determining the total fat in milk, in the testing
amongst dairymen and breeders, have gradually brought about
abandonment of the test churn in creameries, and the adoption
Babcock test in its place."

In "Hoard's Dairyman" of Sept. 7th, 1900, we read the following

"This tester, the Babcock, which as a rule is always
creameries where milk is handled, and also by seventy-five per
the gathered creameries."

No oil test churn is used in connection with treating cream
ered in the province of Quebec. They all use the Babcock.

"June 9, 1902 The above mentioned letters and questions clearly prove that the most scientific and practical authorities are unanimous in their preference of the Babcock over the oil test churn for testing cream, and the oil churn is going out of use.

There is no doubt that the Babcock test is strictly accurate for milk and cream, and well adapted to modern creamery work.

CREAM SAMPLING.

W. D. HOARD. THE CREAMERY, ON THE FARM. HOW TO IMPROVE THE SAMPLE TO BE TESTED.

Manufacturing Cream sampling is to-day the weakest point of cream testing in the United States. All testing methods. What requires to be improved is not the method of testing, because the Babcock is strictly accurate. It is our sampling methods and the quality of cream to be sampled.

Nov. 21st, 1902. It requires a great deal of care to obtain good representative samples, particularly from cream not cooled, not stirred or otherwise treated on the farm. In such cases, cream shippers are in a measure to blame for the unsatisfactory tests. Cream badly kept on the farm gets to be very thick on the top layers, and it requires considerable stirring and mixing to obtain good satisfactory samples on the farm, and in the factory. Cream drivers are often hurried and careless when sampling such cream on the farm. This operation is, as a rule, best done in the creamery, where suitable means are at hand to secure more accurate work.

Co., Amacker." Farmers can do a great deal towards securing accurate tests by sampling sweet, well cared for cream to factories. This can best be done by pasteurizing, cooling and daily stirring the cream to be shipped.

be replaced by Pasteurizing and cooling will keep the cream sweet and fluid, and stirring will help to secure more uniformity in the contents of the cream, a better representative sample of cream, and a more satisfactory test.

THE OVERRUN.

The results of cream testing with the oil test churn, or the Babcock method, do not represent butter. They show what quantity of butter fat, or pure butter oil, is contained in cream. Butter may contain from 10 to 12 per cent. of water, 2 to 5 per cent. of salt and 1 to 2 per cent. of casein, etc. These last elements, all except fat, constitute the overrun or churn over test.

HOW MUCH OVERRUN, WATER AND BUTTER TER? HOW TO CHECK CREAM ACCOUNTS

The overrun obtained in different creameries, and same creamery at different times, may vary considerable amount of butter fat contained in butter varies according to more overrun, the less butter fat it takes to make a pound and vice versa.

But it requires more butter fat to make a first class than to make butter of poorer quality, because poor butter contain an excess of water, casein, etc. Butter containing water will shrink considerably and lose its fine flavor. The general opinion is that, at present, good export butter, if kept any length of time, should contain no less than 12 per cent. of butter fat, and no more than 12 per cent. of water.

It is my opinion, that when pasteurization has come into use we will make still dryer and better-keeping butter, and the overrun will be decreased.

All butter containing over 16 per cent of water is considered adulterated in England.

We notice considerable contradiction as to what should be the average overrun in creameries as the following quotations show.

From "Hoard's Dairyman," Cedar Vale Creamery, September 1900.

1. "We make 15 per cent., or 15 lbs. more butter per pound of fat than the tester shows."

2. "The average overrun in cream gathering creameries is about 15 per cent."

Prof. Dean, Agricultural College, Guelph.

3. "The average overrun in gathered creameries should be 15 per cent., that is, one pound of butter fat should make 1.15 lbs. of butter."—"The Dairy World."

4. "The overrun should never be below 12 per cent. under any condition. The average overrun is from 14 to 16 per cent."—"The Dairyman."

5. "All computation tables add approximately 15 per cent. to the fat found in cream."—"Hoard's Dairyman."

BUTTER FAT IN ACCOUNTS.

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... come into general use, and, of course, ... is considered.

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"The overrun should range from 12 to 14 per cent."—J. D. Dominion Dairy Department.

The overrun in Hoard's creameries, which creameries are receiving milk, is about 12 to 15 per cent."—W. D. Hoard, of "Hoard's Dairyman."

For the purpose of testing cows, The American Experimental Station directors have fixed the overrun at 16½ per cent."—W. D.

In creameries receiving milk, there should be an excess of about 14 per cent., that is, 100 lbs. of butter fat should make 114 lbs. of butter—"Hoard's Dairyman."

In the Quebec creameries, where milk is received, the overrun is from 11 to 14 per cent."—J. C. Chapais, Assistant Dairy Commissioner, Dominion Dairy Dept.

In some creameries there have been cases where the overrun was 20 and 21 per cent.

The above contradictions come from the fact that there are three distinct figures of overrun, intended for three different purposes, and, in quoting, if the purpose is not mentioned, it leads to considerable confusion.

1. The overrun used for testing cows, which has been fixed at 16½ per cent.
2. The overrun obtainable in cream gathering creameries has for the present been fixed at 15 per cent.
3. The overrun obtained in creameries where milk is received, which varies from 11 to about 14 per cent.

There appears also to exist a number of more or less fictitious figures of "overruns" which are the result of keen competition between creameries. They are obtained in two ways: 1st, by reading the test 2nd, by leaving much water in the butter. Such practices should be condemned.

HOW TO CHECK CREAMERY ACCOUNTS.

If you wish to check your cream account, multiply the quantity of cream shipped by the test. This gives you the butter fat in lbs. Then multiply the butter fat by the price. If the quantity of butter given instead of butter fat, multiply the quantity of cream by the test, the result gives you the quantity of butter fat. Divide the quan-

HOW SHOULD CREAM BE PAID FOR? FOR BUTTER FAT?

During the first four years of our central creamery work for cream on per pound of butter. It requires a great deal to make up the accounts, and gives little satisfaction to people. In two years we have adopted the much simpler method of paying for pound of butter fat, and it has, so far, proved to be very satisfactory. The following article from "Hoard's Dairyman," of March 1910, throws some light on the subject.

SELLING CREAM BY TEST.

Ed. Hoard's Dairyman:—"I am separating my milk, lbs. per day, and taking it to a co-operative butter factory the Babcock test. All other patrons carry milk, which is at the factory. I found by churning at home that my butter the amount shown by the factory test. The proprietors then to churn some of my cream and the following is the result

302 lbs. cream test, 29 per cent churned 105 pounds of butter
365 lbs. cream test, 28 per cent. churned 129 pounds of butter
700 lbs. cream test, 26 per cent. churned 262 pounds of butter

You will see that the overrun is much more than 16 per cent. Please tell me how we can arrange it, so that the amount of cream may be paid for in a way to be fair and just to all parties concerned, through your unrivaled dairy paper."—D. D. G.

Ressbun

There is nothing quite so uncertain as churning small quantities of cream, either at home or at the factory. The results are irregular, and it is impossible to estimate from them what the factory overrun should be. In such cases, the best way is for the farmer to buy the butter fat at an agreed price, and then the factory overrun need not enter into the account, and much friction is prevented.

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Practical Dairy Work on the Farm

WANT OF DAIRY INSTRUCTION AMONGST FARMERS.

The weakest point of Canadian Dairying is the lack of practical instruction amongst Farmers. Manitoba is behind Eastern provinces in that respect because our Farmers have not had the same opportunities for learning.

milk, about We cannot over estimate the great loss incurred by the production of poor milk and cream.

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e result :
Success in dairy farming lies in knowing the fundamental principles governing the production of pure milk and cream. Failure is generally due to lack of appreciation of their importance, rather than to intentional neglect.

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Where bad conditions exist, they are in most cases improved so as their dangers are known. In order to avoid dangers one must know their nature and locations.

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In order to arm our farmers against dangers lurking about their premises, we have thought it advisable to write a chapter on Bacteriology.

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BACTERIA AND SOURCES OF BACTERIA.

Bacteria is the enemy of sweet milk and cream. It turns the sugar into lactic acid, and sours the milk or cream.

Bacteria is composed of minute germs of various natures, producing various fermentations and flavors, and are invisible to the naked

The fact that a few millions of such germs are contained in a drop of milk gives you an idea of their size.

These germs are found in enormous numbers almost everywhere in the atmosphere, in water, milk, butter, cheese, mud, and in all kinds and descriptions.

They are most numerous and harmful in stagnant water, slough mud, mud holes, manure piles, contaminated liquid manure, filthy, damp and dark stables, dirty barns, corrals, where cows lie and are sometimes milked, stable dust, food dust, dust from the coat of cows, unclean and filthy houses, tainted milk tanks, unsalted milk vessels and containers, unsalted dish and wash cloths, on unclean milkers' clothes, and wherever the air is damp, foul and impure.

They invade with extreme rapidity all the above mentioned conditions, elements and things, and even the teats of the cow contaminate the milk during the operation of milking. Especially true with cows having open and running teats when the udder is full.

HOW MILK, CREAM AND BUTTER CAN BECOME CONTAMINATED AND TAINTED.

- 1st—By diseased animals.
 - 2nd—By diseased persons.
 - 3rd—By improper food.
 - 4th—By impure water.
 - 5th—By uncleanness in the stable, stable air, stable dust.
 - 6th—By the cow and the milker.
 - 7th—By the fore milk.
 - 8th—By absorption of odors.
 - 9th—By unclean milk houses, milk vessels, tanks and separators.
- 1st.—The first source of infection lies in the cow. If affected with specific and infectious diseases, such as anthrax, tetanus, rabies, cow pox, foot and mouth disease (now so common in the New England States, U.S.), tuberculosis, or any inflammation affecting the cow's blood, the germs of this disease will find their way into the udder and into the milk pail.

are contained in tuberculosis has been transmitted through milk to man, calves, and poultry, and in these various ways human life has been endangered. Foot and mouth disease has been transmitted to man, sheep, hares, pigs, etc. It is not uncommon for some cows to give thick or strong milk at different periods of gestation.

One of the great dangers which arise from milk is that most dangerous poisonous substances are sometimes conveyed through the lactation of the cows, without any harm to herself, and also from the milk forming bacteria, which gets into milk through improper handling. The numerous cases of ice cream and milk poisoning, and the mortality of bottle-fed infants, are, to a great extent, due to the above mentioned causes.

2d.—The second source of infection lies in the wonderful power of milk, cream and butter to absorb odors of all kinds, germs of disease of all natures.

In their raw condition, (without pasteurization) milk and cream are common means of spreading diseases to man and beast. During the decade ending in 1899, 53 epidemics of typhoid fever, 26 of scarlet fever, 11 of diphtheria and 3 of miscellaneous throat affections have been directly traced to milk, in the United States. Enteric fever has also been traced to milk.

3rd.—Unsuitable foods. Turnips, rape, coarse grasses, wild onions and garlic. Weeds will give a bad flavor to milk, worm weed, ragwort, will give a bitter flavor. Damaged food such as rotten ensilage, moldy hay, sour or musty grain will give milk a disagreeable taste and flavor. In some seasons, cows feeding on coarse weeds and coarse feeds having active medicinal and poisonous properties, will produce poisonous milk, most dangerous to public health. Or again, milk and cream may undergo alterations, fermentative in character, through the presence of lowly forms of life, and thus acquire poisonous properties. It may be the vehicle by which vegetable or mineral poisons are introduced to the human stomach, after having first been through the system.

4th.—Water, swamps, slough, stagnant water teeming with bacteria of the worst kind. Water from cisterns, shallow wells, shallow streams, or water which has been long exposed to the air, can not be relied upon. In some cases surface drainage in a barn yard or the surrounding, from privy vaults, drain through the ground to a well, without the farmer's knowledge. In this manner, such water used in a variety to wash milk cans, etc., has spread typhoid fever.

The same water may also affect the quality of the milk indirectly by injuring the health of the cows.

Frequently milk and cream are stored or cooled in tanks. This water is rapidly fouled by dirt, by impure ice, by mud over, and it becomes another means of contamination. Bacteria are one of the greatest sources of harmful bacteria in milk, and is a great danger to public health, particularly to that of children.

UNCLEANLINESS IN THE STABLE.

FROM THE COW.

5th.—Stable dirt gets into the milk from the cow, the milker. The chief source of infection lies in the external cleanliness of the cow. Most impurities found in milk get into the milk during milking, and during the time it remains in the stable. Hence the importance of removing it from the stable as soon as each pail is filled. Grotenfeldt found in unstrained fresh milk the following impurities: Manure, particles of fodder, mold, fungi, cow hairs, pieces of human hair, parts of insects, down from birds, bits of wood and linen thread, soil particles, etc. The hairy skin of the cow is covered with dust which contains immense quantities of bacteria. The udder, part of the cow, the udder, legs, etc., often acquire a great number of bacteria in going through swamps, mud holes, etc. When in the stable, and when not properly cleaned, the cow's limbs, sides and udder become very much fouled with particles of dung (excrement). By the shaking motion of the udder during milking, these particles of filth, dirt and hair are dislodged, and fall into the milk pail.

FROM STABLE, AIR AND DUST.

Stable floors, impregnated with liquid manure, emit objectionable odors and germs, which will find their way into the milk. Where hay, straw, chaff or other coarse dry fodder is fed, and dusty bedding is used, the barn air is much infected with particles containing large numbers of bacteria. When feeding fodder at the milking time, the danger of milk contamination is considerably increased by the increase of bacteria in the air. The experiments conducted at the University of Wisconsin showed that the germs were so deposited per minute in an area covered by a

UNTIDY MILKERS.

6th.—On some farms, milking is looked upon as the dirtiest of all work, and milkers prepare accordingly. After cleaning horses, or doing similar dirty work, with unclean and dusty clothes, dirty hands and finger nails, they milk the cows without the least thought of their unclean condition to do so.

From what precedes we can readily see that the bulk of impurities contained in milk consists of stable dirt, chiefly manure. Over 50 millions of this matter have been found in 100 lbs. of milk, and when it is known that such dirt contains myriads of bacteria of the worst kind, germs introduced in that way in large numbers, act as poisons to the delicate consumers' stomachs. This is the reason of epidemics of cholera infantum during the summer months.

7th.—Infection from fore-milk.

A few drops of milk are always left in the teat from the previous milking. Myriads of germs are spread all over the udder. They enter the teat at the open end, and contaminate the milk. They grow at a rapid rate in the teats of the cow.

The following results of experiments, conducted by Prof. A. W. Allen at the Indiana Experimental Station, give an idea of the number of bacteria in the milk, and of the great variations in the number of bacteria contained in fore-milk.

In eleven successive milkings, the fore-milk showed the number of bacteria present per cubic centimeter, as follows:—122,000, 1,353,000, 12,800, 32,000, 14,400, 8,200, 5,000, 22,000, 6,000, 8,000. The following is the average number found in the milk of cows, the fore-milk not being mixed with it:—10,000, 2,000, 2,200, 2,400, 1,800.

In some cases when the first few streams of milk are kept apart, the milk soon gives an offensive, putrid odor, showing the presence of a large number of putrefactive bacteria.

If the first or fore-milk is mixed with the rest of the milk, it will contaminate the entire mess.

8th.—Absorbing odors.

Experiments conducted by Prof. Russell at the Wisconsin Agricultural College, showed that, contrary to common belief, exposure of hot and cold milk to an atmosphere charged with various vapors and odors such as manure, urine, ensilage and different volatile substances, both hot and cold milk absorbed distinctive odors in the course of a

few hours. Moreover, the intensity of the odor was more in the warm than in the cold milk. So that warm or cold become tainted from strong odors, in the stable, milk house or wherever such odors exist.

9th.—Unclean, damp milk houses or rooms, and unclean vessels.

One of the main sources of contamination after the milk is taken out of the stable is unclean milk rooms, unclean milk vessels and, above all, unclean milk vessels and separators.

UNCLEAN DAIRIES.

The chief defect of a dairy room is to be damp. Dampness and darkness are favorable to bacteria. It is impossible that milk can remain sound in an unclean, strong smelling place.

UNCLEAN MILK VESSELS.

Please bear in mind that, even the application of scalding water and steam will fail to destroy bacteria if only used a few minutes. So it is utterly impossible to clean milk vessels without the use of water or steam. The smooth surface of separators, pails and other vessels in use are covered with numerous bacteria, and cracks and joints are filled with myriads of germs. Cleaning with ordinary warm water will remove the bulk of the dirt, but many bacteria will escape. To give you an idea of the importance of cleaning milk vessels, thorough experiments showed that milk, from a sterile pail contained 165 germs per cubic centimeter, whilst milk received in a vessel cleaned in the ordinary way contained 165 germs per cubic centimeter.

HOW BUTTER IS INFECTED.

In spite of centrifugal separation and clarification, germs in milk will find their way into cream and butter. Two out of 100 of butter secured in open markets in Europe containing germs of tuberculosis, were found to contain germs enough to spread the disease. Of course, with butter the danger is not so great as with milk or cream.

BACTERIA IN MILK AND CREAM

Bacteria can be divided into three groups :

1st.—The harmless. They come from pure air, and are the most numerous in milk.

2nd.—The useful. They are the kinds required to produce flavor in butter, and to ripen cheese.

3rd.—The harmful to health. They are of two kinds. (a) The bacteria producing putrid fermentation in milk. (b) The pathogenic or disease-producing bacteria. Both may cause disastrous results to the consumer.

THEIR NUMBER.

1st.—It is almost impossible to get milk entirely free from bacteria. There may be from a few hundred to many millions of germs in a quart of milk, according to age of milk and care in handling.

2nd.—Immediately after milking, milk may contain 1,000, 50,000 or 100,000 bacteria per cubic centimeter, according to care in handling.

NUMBER OF BACTERIA IN MILK AND CREAM.

	Minimum	Maximum
MILK.....	25,000	15,627,000
PER CENT. CREAM.....	423,000	32,800,000

As a rule cream is richer in bacteria than milk. The quantity increases the care milk has received. After from 12 to 24 hours, milk containing millions of bacteria shows that it has not been properly stored.

THEIR RAPID GROWTH.

One of the characteristics of bacteria is their wonderful reproduction. In some cases a single germ may in 24 hours multiply from one to 20,000,000 germs.

The conditions most favorable to their development are heat, food, dampness, moisture, darkness and dirt. They grow rapidly at a temperature ranging between 89 and 109 degrees Fahrenheit.

Bacteriologists have found that at 93 degrees Fahrenheit germs may increase in number in four hours more than ten fold, while at 55 degrees they increase about eight fold. If milk stand two hours before cooling, milk may contain 23 times as many bacteria as when the milking was finished. The same milk cooled to 55 degrees contained only four times as many as when it was finished.

At 50 degrees Fahrenheit, bacteria is, for a time, quite inactive at this, and even a considerably lower temperature, they are inactive and some kinds continue to multiply.

Freezing does not kill them. Their inactivity at 50 degrees Fahrenheit is temporary. After a time they grow rapidly into millions.

The conditions required to check their growth, and to prevent their destruction, are extreme cold, extreme heat, dryness, light and air. Direct sunshine is fatal to them. Their growth does not even cease at 114 degrees Fahrenheit. At 125 degrees Fahrenheit their growth ceases. 165 degrees is sufficient to kill almost all of them in an open vessel. 140 degrees in a closed vessel. 140 degrees Fahrenheit will kill tubercule bacilli in twenty minutes. Spores will require 160 degrees for destruction.

I have seen whole herds of cows so much affected with mastitis that pus was running from the teats. Yet the milk from these cows was used.

Anyone who knowingly sells the milk of cows suffering with mastitis should be subjected to criminal prosecution. The pus, cocci, particularly the streptococcus, has in several instances been revealed in the abscess pus, and traced from the cows' udders to the baby's stool.

Dr. Woodward observed a most instructive example of mastitis, in which the milk from diseased cows had not only been used for food, but also the milk of a whole herd, but also the whole supply of milk for the dealer.

EFFECTS OF STRAINING AND CLARIFICATION OF MILK.

wonderful power of milk should be strained and clarified, when possible. Straining in 24 hours removes the solid dirt from the milk, but not the bacteria. The same can be said of clarification.

ment are a certainty of. H. L. Russell, Bacteriologist of the University of Wisconsin, t. They develop in this subject:—

at 109 degrees Fahrenheit, certainly it may be thought that straining and otherwise cleaning the milk removes this stable filth. So it does, with visible filth, but not until it is folded. If allowed to stand 23 times as much as milk cooled to when milking

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WHAT IS CLARIFICATION?

is the running of milk through a centrifugal separator. No it effectually removes solid dirt from milk, and the bacteria at to it. It is assuredly a useful operation. But as far as pro the public against objectionable bacteria and germs of disease, DELUSION.

TO PREVENT THE IRRUPTION OF DIRT, OBJECTIONABLE BACTERIA AND DISEASE GERMS IN THE MILK, CREAM, ETC.

the irruption of dirt and objectionable bacteria can be to a great prevented by all-round cleanliness. By moistening of the cows' prevent dirt, by keeping the cows clean, washing the udder ank of the cow, using covered milking pails, and not mixing the lk, over 90 per cent. of the bacteria can be excluded from milk.

must have healthy cows, cleaner stables, cleaner cows, cleaner and water, and cleaner separators and dairy utensils. A great can be accomplished by strictly following the rules and regula- for the production of sanitary milk and cream on pages 54-58.

Public Protection

DESTRUCTION OF BACTERIA AND GERMS OF MILK, CREAM AND BUTTER.

Our remarks on bacteria, etc., clearly show :—

1. That it is almost impossible to completely exterminate bacteria from milk.
2. That poisonous substances, most detrimental to health, work their way through the cow, into the milk, cream and butter.
3. That the milk from a few diseased cows may constitute a large portion of the milk supply of a city.
4. That germs of many epidemics, and most dangerous, can find their way into milk, without the knowledge of the consumer, and that milk must become contaminated with dirt and impurities, and that kind and putretive bacteria of the worst description, may be introduced into the knowledge of the milk dealers.

As already stated, it makes very little difference if the dirt are removed by the strainers or clarifiers, the objectionable bacteria which are introduced with dirt and dust are washed out of the milk, and will go through any kind of strainer or clarifier.

I can therefore safely say that the only way of protection against dirt and disease germs contained in milk, cream and butter is PASTEURIZATION.

The Hand Separator

When the first hand separator was brought to Canada, very few thought it would play such an important part in the present and future dairy work. Since it is the creamery tool of the future, we must see that farmers get machines well adapted to modern dairy work. We expect every farmer keeping cows to have a separator, and every hand separator should possess the following qualities:—

1. It should be light to operate, since the speed must be

A good separator should be made safe, strong and durable. Many separators get out of order, after a couple of years use, at great inconvenience and loss to farmers.

The motion should be easy and steady. Lightness of operation is an important point, since its full speed must be kept up for skimming. An unsteady motion is a source of great loss to separators.

The revolving parts should be well protected.

The construction should be simple and plain, and the manner of use easily understood.

The separator should be easy to take apart and to clean.

IT SHOULD GIVE CREAM OF UNIFORM RICHNESS CONTAINING NO LESS THAN 35 TO 40 PER CENT. BUTTER FAT, WITHOUT LEAVING ANY IN THE SKIM MILK.

It should be able to skim heated milk at 140 to 165 degrees, and give 35 to 40 per cent. cream.

It should be able to skim moderately cold milk.

The milk pan should be low and easy of access.

The machine should be cheap in its cost, and easy to put up; the main point is that the machine be good, for an unsteady, cheap separator, even though cheap, will be a more expensive one in the long run, than a good one at a higher price. Experiments should be made to determine the above mentioned qualities in separators.

CARE OF A FARM SEPARATOR.

See that it stands perfectly level and firm.

When not in use, keep it well covered so as to prevent dust and dirt from getting into the bearings.

Clean all the wearing parts thoroughly, not less than twice a week.

4. In separating, maintain an even, regular speed at the indicated number of revolutions.
5. Have the cream-screw set so as to throw a to 40 per cent butter fat.
6. When the milk has all been separated, flush pouring into same about one quart of water.
7. After separating, take the milk and cream p bowl apart, and wash all parts, reservoir and pans; v water, using a little washing powder in water, then hot water, and put in the air and sun to dry.
8. Wash thoroughly after each time it is used.
9. Never put the bowl together until wanted for

CENTRIFUGAL CREAM SEPARATION

Cream separation and modern creamery work, as offer new and intricate problems, which are not gene It is through the want of technical knowledge that m arise, sometimes, between the creamery and its pa through the dissemination of sound practical knowledge to dispel such misunderstandings, inspire confidence in help to increase your creamery returns. As a rule, fa the impression that nothing but the cream screw w alter the richness of the cream. This is a delusion, a will show :—

The capacity of a Cream Separator is the large milk it can skim per hour, leaving but a minimum of milk, say 0.05 0.10. It increases or decreases according of the speed.

VARIATIONS IN THE RICHNESS OF CREAM

As cream separation is closely allied to variations in order to avoid repetition we shall treat the two together.

lar speed. Turn the three main factors to be considered in centrifugal cream separation are **SPEED, INFLOW and TEMPERATURE.**

row a cream of **Completeness of Cream Separation is influenced by**

Cream will vary greatly in richness according to

Speed.
Steady and unsteady motion.
Temperature.
Inflow of milk.
Quantity of Milk.
Milk from fresh cows.
Milk from strippers.

1. Speed.
2. Steady and unsteady motion.
3. Temperature.
4. Inflow of milk.
5. Quality of milk.
6. Milk from fresh cows.
7. Milk from strippers.
8. Quantity of water or skim milk used to skim the last content of Separator.
9. Evolutions of the cream screw.
10. Clogging of the skimming tubes.

used.

nted for separation

RATION.

SPEED.

The higher the speed, the more thorough the cream separation. If, any cause, the speed decreases, the milk will not be completely separated, a portion of the butter fat will be lost in the skim milk, that misunders portion of the skim milk will go into the cream. The higher the its patrons, and the richer will be the cream and the higher will be the test. knowledge that the higher the speed, the thinner the cream, and the lower the idence in our work rule, farmers are screw will in a fusion, as the fo

STEADY MOTION.

An unsteady motion has an enormous influence in the complete cream separation and the richness of cream. Farmers sustain the largest quantity of fat in the cream in running wobbling separators. An unsteady separator according to the half skim the milk, and leave very large quantities of skim in the cream, making it very thin, poor, and giving a low test creating endless difficulties between patrons and creameries. met with quite a number of such cases recently. Get these things fixed, as you may lose far more than the expense of re-

OF CREAM.

TEMPERATURE.

lations in the milk the higher the temperature of milk, the more thorough the cream the two questions, and the poorer the cream. Very thin cream comes out of

hot milk, unless the cream screw is fixed to give very little. The lower the temperature, as a rule, the richer the cream, the greater the loss of fat in the skimmed milk. We will, however, make out below a most important exception to this rule.

INFLOW.

The larger the quantity of milk which flows into a separator at a given time, the less thorough the cream separation, and the poorer will be the cream. Reduce the inflow, and the separation will be thorough and the cream will be richer.

QUALITY OF MILK.

The richness of cream also varies with the richness of the milk. It varies every day according to the degree of comfort which the cows receive. Breeds and feed have also some influence in the richness of the milk.

MILK FROM FRESH COWS.

The milk from freshly-calved cows is, as a rule, very rich, and the cream obtained from it will be correspondingly rich. Such milk will easily yield its cream, because the molecules are large.

MILK FROM STRIPPERS.

In this the farmers have quite a difficult problem. Milk from strippers or from cows which have been milked for eight months is very rich in solids, and the molecules of fat are very small, so that it is difficult to skim it by any method of cream separation. Farmers will sustain great losses, and experience great disappointments in the size of creamery cheques if that milk is skimmed on the cold side and at a reduced speed. This is likely to be the case on many farms during harvest and threshing time. Heat the milk to 140 degrees in the ordinary way, or better, in a pasteurizer, run the separator plenty of speed, and reduce the inflow. Fix the screw so as to give very rich cream if you are shipping cream to the creamery.

QUANTITY OF WATER USED IN SKIMMING THE TENTS OF A SEPARATOR BOWL.

The quantity of water used in that particular may have a considerable effect on the richness of cream, particularly in the fall.

give very rich cream, 10 lbs. instead of 150 lbs. of milk is skimmed, and say 1 quart to 1 pint of water is used to chase the last contents of the bowl. In such cases this may happen with the motion of the machine. In this case we would have three times as much water in the cream of 10 lbs. of milk as in the cream of 150 lbs. of milk. This would lower the richness of the cream.

EVOLUTION OF THE CREAM SCREW.

With some separators, the cream screw at times becomes so loose that it will turn one way or the other in wiping the bowl. In such cases this may happen with the motion of the machine. In this case the richness of cream may vary greatly without the knowledge of the farmer.

THE CLOGGING OF THE SKIMMING TUBES.

When skimming milk in considerable quantities, the milk and cream will sometimes become clogged. In such cases, the cream will come out in a very thin condition from the machine.

The principles governing centrifugal cream separation are contained above, and demonstrate the fact that if at all times the separator is given plenty of speed, and the milk plenty of heat, good results may be expected. Farmers can expect more uniformity in the richness of cream when their separators are set to give rich cream, say 40 per cent., than when they are set so as to give 15 to 20 per cent.

Always strain the milk before pouring into the milk receiver. Separate as soon as possible after milking.

TO PREVENT, AS MUCH AS POSSIBLE, VARIATIONS IN THE RICHNESS OF CREAM.

Follow closely the principles governing cream separation as above.

Fix your separator, so as to give from 35 to 40 per cent. cream, and as a rule your cream will be very much less, than if you skim 20 per cent. cream.

THE LAST

WL.

may have come in the fall. So

CREAMERY WORK.

The quality of cream required for modern creamery work is 40 per cent. For the following reasons :—

1. To prevent waste of the skim milk, and keep a lot of feed on the farm.
2. To reduce the cost of transportation.
3. To help the cream to keep sweet.
4. To reduce the loss of butter fat in buttermilk.
5. To prevent great variations in the richness of cream.

It is evident that the transportation of twenty per cent cream will cost twice as much as the transportation of forty cream. That is a most important item. 40 per cent. is the cream which American creameries are calling for now.

The following gives an idea of what is being done elsewhere in particular:—The Hazlewood Creamery, Portland, Ore. says

"Try to skim your cream so that it will run 35 to 40

From "Hoard's Dairyman," April 18th, 1902 :—

"I am selling my cream to a creamery company. When I tested the whole cream, test ranged between 29 and 35 per cent. They take one pipette cream and 3 pipetts water, and my test is 24 to 28."

"Which is the correct way to test cream? My separator separates out 19½ lbs. cream to 100 lbs. milk. Is this too much? We have more overrun in cream that tests 40 per cent fat, then cream that tests 30 per cent of fat? I get no share of the overrun.

"Spring Green, Neb.

"The dilution of the test sample has no effect on the test, but as we have often said, the only exact method cream is weighing the sample instead of measuring by the

"It would be better to run a thicker cream up to 40 per cent if possible. There is then less waste of skim milk, the cream runs longer and there is less bulk to be handled. The richer the cream churned, the greater will be the overrun, as there is less fat in the buttermilk. Whether you should receive any credit for the overrun will depend on the way in which your cream is bought. If you are paid a certain price for butter fat, you have no interest in the overrun.

FOR MODERN

The Farm Pasteurizer

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The farm pasteurizer is a new apparatus. Until now, all pasteurizers were complicated, costly machines, and required steam for heating.

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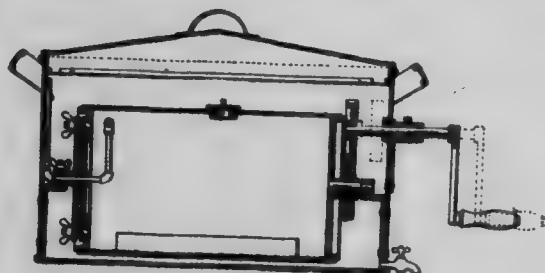
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horizontal and cylindrical shape offers the largest possible surface for the action of heat and cold. I think we have succeeded fairly well in meeting these requirements by the production of "The Barre Mignault Farm Pasteurizer." It appears to possess all the above mentioned qualities, it can be used on an ordinary stove, or any other having a flat top. Large sizes can be made to fit any farm vat, or any self-heating or steam-heated vat. Anyone who can read figures on a thermometer could operate the machine.

DESCRIPTION.

It consists of a removable metal revolving cylinder, placed in a vat, which can hold hot or cold water. For the smaller sizes, we placed it in an ordinary clothes boiler. A vent has been located at the end of the axes to exhaust any gas which may form during the operation. A very simple contrivance allows the cylinder to be ungear-when it becomes necessary to remove it. A large opening in one of the ends of the cylinder allows full inspection of the inside, which contains only a longitudinal flange, and a part of the vent tube. A pair of double faucets allows the cream to come out of the pasteur-

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DIRECTIONS FOR PASTEURIZING

Run the cream direct from the separator into the cylinder with milk or cream, about three parts for one. Place the pasteurizer on the kitchen or other flat surface. Hermetically closed the head door. Add water enough to cover the vessels so that the cylinder will be covered up to three inches height. You may use warm water to save time. Keep the temperature of from 140 to 150 degrees Fahrenheit. to 140 Fahrenheit and NO HIGHER. Keep up the temperature for twenty minutes. Turn the crank of the speed of about 20 revolutions per minute, so that the cylinder may be thoroughly and uniformly heated. Take the pasteurizer off the stove, add cold or ice water, and cool to fifty degrees. Turn the crank as before. When thoroughly cooled empty your cream can.

Cream and milk so treated and kept in cold or ice water will remain sweet a week, particularly if cleanliness has been observed in milking, etc.

So there exists no more reason for shipping sour cream, or making a poor quality of butter.

ADVANTAGES OF PASTEURIZATION

WHEN AND WHERE SHOULD IT TAKE PLACE

1. It will do what dairymen have failed to accomplish in five years, that is, improve to a material extent, the quality of cream butter.
3. It will revolutionize the milk trade, and ensure a supply of milk to the consumer.
4. The manufacture of condensed milk and other milk products will be possible almost anywhere.

THE MILK AND SWEET CREAM TRADE

The hand pasteurizer will revolutionize the milk and cream trade. As a rule, the milk trade has been confined to farmers in the vicinity of cities and towns. With suitable transportation the hand pasteurizer will enable milkmen to select milk from the most careful farmers within a radius of 300 to 500 miles from cities.

PASTEURIZING.

Milk fresh from the cow, and cream immediately after separation, contains the least number of bacteria. It is, therefore, in its best condition for pasteurization.

It is possible to check the growth of bacteria for some hours with parts full, after having been pasteurized, but impossible to prevent their development, even at a low temperature. The older the milk and cream, the more bacteria these liquids contain, and the more difficult they are to pasteurize effectually. Keep the cream at a certain stage, pasteurization is useless. Heat the cream to the above mentioned temperature.

Milk nearly always contains particles of dirt and impurities which enter it during milking. Hence the great importance of clarifying milk and cream as soon as possible after milking, so that such impurities have time to soak and taint. Pasteurizing milk and cream as soon as possible after milking, or such impurities have time to soak and taint.

Clarification removes solid impurities; cleanses the milk, and improves pasteurization destroys taint, objectionable bacteria, and all disease.

For sour cream to cream, milk and cream being immediately clarified by the hand separator, the farm pasteurizer will destroy bacteria before they have time to multiply, and will insure a most thorough operation. The cream so obtained, will, if properly treated, be as pure and as perfect a product as it is now possible to get under any known conditions.

PASTEURIZATION.

THE BEST PLACE.

Pasteurization will prevent the souring of cream for some days, a week under suitable conditions (cold) and the development of objectionable bacteria.

It is now an assured fact that bovine tuberculosis is transmissible. Germs of tuberculosis and other diseases have been traced into cream, butter, etc. Pasteurization will leave milk, cream and skim milk in a perfect state for human food, and also for other milk products.

THE BEST TIME.

Two-thirds of the deaths of babies are due to diarrhoea and infantum, caused by unsuitable nutrition, and, in a great measure, by milk containing a certain quantity of objectionable bacteria. It is, therefore, to solve the city milk problem with pasteurization, and to prevent, in a considerable measure, disease and premature death in children. Every house should have a domestic pasteurizer.

This proves conclusively that the best place and time to pasteurize milk and cream is on the farm, immediately after milking and separation.

OBJECTIONS.

I expect some opposition to the new plan of work. All improvements have shared the same fate in that respect. Witness the centrifugal separator. Can this operation be properly done on a farm? Some will naturally ask. My reply is, the farm is the place where it could be most effectively done. A variation of 10, 15 or 20 degrees above normal temperature would not damage cream. Pasteurization would be the more complete. A few weeks ago I sent a variety of machines, with my scant instructions to a farmer. A few days afterwards, we received by express, during an exceedingly hot day, a can of beautiful cream, perfectly sweet, and which was as sweet two days afterwards. This is sufficient to prove the value of the process. Others may say "How could the quality of the milk and cream be controlled, how are we to know the true condition of the milk or cream as to efficiency or otherwise when received at its destination?" Opacity, bacteriology, and the acid test will reveal the exact condition of every can of milk or cream, as to the amount of heat used, its freedom from bacteria, and degree of acid therein. The rural population of Canada is much readier to appreciate such improvements than it was twenty years ago.

PASTEURIZATION OF WINTER CREAM.

The inferior quality of butter is now made in winter, for the following reasons: (1) The stable flavor of milk. (2) As cows are giving large quantities of milk during that time, the cream is kept too long before being shipped. Pasteurization will rectify some of the stable flavor, it will also counteract the effect of some weedy flavors, although not all, and keep the cream sweet for shipping.

COOLING THE CREAM.

That is the most important part of the farmer's work after pasteurization. Cooling must be done as soon and as rapidly as possible after pasteurization, so as to prevent the development of specially full grown bacteria, and in that way prevent the souring of the cream. This must be thoroughly done. Placing a can of milk in a tank of luke warm water, and the water only half way up the can, will not do. It can be best accomplished in the closed pasteurizer because the cream can be thoroughly closed, and no bacteria from the air can come in contact with the pasteurized liquid. It is so done in a deep setting can. There are also specially constructed cans for the purpose. Passing the milk or cream two or three times

of these coolers would cool it, I think sufficiently, provided cold water is used at the same time.

The only objection to this plan is that if in the place when the operation is done the air is not pure, objectionable bacteria might gain mix with the pasteurized liquid.

CARING FOR THE CREAM.

Always have a clean, sweet receptacle to receive the cream from separator, and to hold it until shipped. After being thoroughly cooled, it may be held in the shipping cans, which should be placed in water.

NEVER MIX TWO BATCHES OF CREAM TOGETHER UNLESS EACH IS THOROUGHLY COOLED.

Never use your cream delivery can as a receptacle for cream from separator.

Protect your cream can with a wet blanket in the summer, or with a robe in the winter during transit to the railway station.

Deliver the cream as often as possible, summer or winter.

Remember that the use of the hand separator, and the cream separating plan of creameries has, in a great measure, shifted the responsibility of making good butter from the butter-maker to the farmer.

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RULES REGULATING THE PRODUCTION

—OF—

Sanitary Milk and Cream

TO MILK PRODUCERS AND ATTENDANTS.

1. Read current daily literature, and keep posted on new methods.
2. Observe and enforce the utmost cleanliness about the person, their attendants, the stable, the dairy, and all utensils. We have cleaner stables, cleaner cows, cleaner milking, and cleaner dairies.
3. A person suffering from any disease, or who has been exposed to a contagious disease, should keep away from the cows and dairies.

THE STABLE

4. It is almost impossible to thoroughly clean a stable with dirt or plank floor, soaked with liquid manure. The smell of the manure cannot be removed, and will contaminate the milk. It is a great advantage to have cement floors.
5. Stables should be whitewashed every three months, and clean straw used for bedding, and land plaster should be used in the manure gutter daily.

6. Use no dry, dusty or musty feed or bedding before milking. Waten the fodder if it is dusty.

7. The stable should be thoroughly cleaned and aired before milking. In hot weather sprinkle the floor. Lime dust will chase the flies.

8. Stables should be built large enough to allow 750 cubic feet of space for each animal.

9. Stables should be well ventilated, lighted and drained. They should have tight floors and walls, and be plainly built.

10. While keeping the cows comfortable, stables should have some means of taking the heavy air from the floor up and out of the building.

11. Keep the stable and dairy room in good clean condition.

12. Keep the dairy cows, as much as possible, in a room or building of their own. Milk from fresh cows should be rejected until the first milking.

THE COWS.

1. Have your cows examined at least twice a year by a skilled veterinary surgeon. This may save you hundreds of dollars.

2. Promptly remove from the herd any animal showing indisposition, or signs of disease, sore or ulcerated teats, and reject her milk.

3. Never add an animal to the herd until you are sure it is free from disease, particularly tuberculosis.

4. Keep your cow as clean as your horses. Use the curry comb, and brush.

5. See that your cows get sound food. Do not allow any strong flavored feed, like garlic, cabbage, turnips, or rank weeds, such as we have in Manitoba. Never give cows dusty feed before milking.

6. Do not change the feed suddenly.

7. Pure water should be provided in unlimited quantity for cows, but should not be too cold. Keep the cows away from sloughs, stagnant or impure water.

SALT

20. A box or trough, containing salt to which cows have free access should be provided.
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MILKING.

21. Remember this is the most important part of your operations. Success lies in doing it with the utmost cleanliness.
22. The milker should be a person of clean habits. He should not smoke. He must wash and dry his hands just before milking.
23. The milker should wear a clean outer garment, only when milking, and which should be kept in a clean place.
24. All milkers should cut their finger nails closely. They should use clean tin milk pails. The joints and seams should be well soldered, so as to present a round surface, which can easily be cleaned.
25. Do not allow cats, dogs, or loafers around at milking. Do not allow cows to be excited, worried or annoyed in any way.
26. Do not milk before the udder, flanks, and surrounding parts of udder are brushed, cleaned, washed, and moistened. Wash with a clean cloth or sponge.
27. In the case of large herds, a washer should go from cow to cow, thoroughly cleaning the udder.
28. Milk with dry hands. Never allow the hand to come in contact with the milk.
29. Whenever milking is done, milk should be kept in a place where the surrounding air is pure, otherwise the milk will be tainted or injured.
30. Milk quietly, quickly, cleanly, and completely. Never leave any milk in the udder.
31. Milk at regular hours, morning and night, and milk as much as possible in the same order.
32. The milk should pass into a covered pail, or into another covered with two thicknesses of cheese cloth, and about a

absorbent cotton, all of which should have been thoroughly sterilized by steam or heat.

3. Throw away (not on the floor, better in the gutter) the first streams of milk from each teat, because it is filled with bacteria.

4. If, during any milking, a part of the milk is bloody, stringy, unnatural or offensive, the whole mess should be rejected.

5. If any accident occurs by which a pail full or partly full of milk becomes dirty, do not try to remedy this by straining, but reject all this milk and clean the pail.

CARE OF MILK AND CREAM.

Never allow milk to stand in or about the stable. **REMOVE AS SOON AS YOU HAVE A PAIL FULL. THIS IS VERY IMPORTANT.**

6. Do not even allow your milk cans to stand in the stable while they are being filled.

7. Strain the milk through metal gauze, flannel or cheese cloth, or a layer of absorbent cotton.

8. If the milk is to be sold in nature, clarify it by passing it through your cream separator. First unscrew the bowl screw so as to have very thin cream, allow both cream and milk to fall, and mix in one vessel.

9. Pasteurize at 140 degrees for twenty minutes.

10. Cool at the temperature of your well or ice water.

11. Keep the flies away from the milk by placing a mosquito net over the cans when left uncovered.

12. If the milk or cream is stored, it should be held in tanks of cold water, which should be renewed every day.

13. Never mix warm milk or cream with that which has been cooled.

14. Do not allow the milk to freeze.

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46. When cans are hauled a long distance, they should be carried on a spring wagon.

47. In hot weather, during transportation, cover milk cans with a clean wet blanket or canvas.

48. Tin pails only should be used.

CLEANING UTENSILS.

49. Never allow milk vessels or utensils to stand a long time before washing. Clean them immediately after they are used.

50. All separators and separator parts should be cleaned soon after time they are used. A brush is preferable to a dish cloth.

51. Wash first in luke-warm water, to which a little soda has been added. Remove all particles of milk from the surface and creases, clean the inside and outside with a brush. Then wash in water, in which soda, soap, powder or lye has been added. Sterilize by using plenty of scalding water, long enough to kill bacteria.

52. In washing cans after cleaning in the usual way, immerse in scalding water, fasten on the cover, shake the cans thoroughly, and let the water to stand ten minutes.

53. When soap is used, care should be taken that no soap suds remain in the cans, as they are injurious to the milk.

54. Boil cloth strainer, and wash wiping cloth and brush daily.

55. After scalding, the utensils should, as much as possible, be placed in the sun to air and dry, but they should also be protected from dust.

S. M. B.

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S. M. BARRE

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Sketch of S. M. Barre's career as a Dairyman

Served his apprenticeship as a butter and cheese maker in 1877-78.

Attended the Chicago World's Fair in 1879, where Canadian carried first prize. Saw there the first cream separator ever in the world.

Established the first creamery in the Eastern Townships in

Was delegated to investigate dairy farming in Europe. Followed a course of Dairying at the Royal College of Denmark under Thos. R. Segelthe—1880-1881.

Published an interesting report of his investigation—1882.

Introduced the first Cream Separators in Canada (power machine spring 1882), which has proved to be the greatest dairy improvement of the 19th century.

Organized the first Separator Creamery in Canada—1882.

Organized the first Dairy School in Canada—1882.

Took charge of the first Government Creamery in the Province of Ontario. Occupied the first Chair of Dairying at the Guelph Agricultural College.

Visited every creamery in Ontario and reported on needed improvements.

Came to Manitoba as a lecturer on Dairying in 1886.

Established the first Creamery in Manitoba and shipped the Creamery Butter to British Columbia in 1887.

Introduced into Manitoba the first hand separator Canada had. The machine is still in use—1887.

Carried the first prize for Manitoba creamery butter in Toronto and Ottawa—1887—and 99 points for Manitoba cheese at the Fair, Chicago—1893.

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15. Obtained for the butter and cheese factories an exemption from taxes for 20 years.

16. Established in connection with C. Mignault, of Manitoba, nine butter and cheese factories and five tions.

17. Addressed the tariff commission in 1899 on the placing cream separators on the free list, requesting the of customs to do so, which request was subsequently granted.

18. Organized in Manitoba in the year 1896 the Creamery conducted on the hand separator plan in Canada, obtained from the Canadian Pacific Railway, and other companies, the cream transportation rates which were of great benefit to the farming community for 5 years.

19. Operated the first winter creamery in Manitoba.

20. Was first to apply the system of paying for milk to butter fat, in Manitoba butter and cheese factories.

21. Was first to apply the Babcock test in Manitoba.

22. The, Winnipeg Creamery, the latest of S. M. Barre enterprises, is entering into the seventh year of its existence, organized to meet certain special conditions of Manitoba and has fully realized all expectations.

23. Has invented and placed on the market the first sterilizer, which promises to help in revolutionizing the dairy industry and milk trade.

24. Mr. Barre has been one of Canada's most active during a quarter of a century. He has done the largest work in the development of Manitoba dairying, and therefore and should receive the hearty co-operation and support of the community.

A friend of agricultural progress.

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APPENDIX

To Cream Transportation Rates in "The Twentieth Century Creamery," by S. M. Barre, Winnipeg Creamery and Produce Co., St. Winnipeg.

SCHEDULE I.

SCHEDULE OF CREAM TRANSPORTATION RATES

From various shipping stations in Manitoba to Winnipeg, and showing the Rates for corresponding distances in the Provinces of Ontario and Quebec, and in the United States.

5 gallon cans.

Distance Miles	Shipping Station.	Present Manitoba Rates.	Ontario and Quebec	U. S. A. Chicago and St. Paul.
48	Arnaud	10	10	11
108	Arden	35	18	16
138	Banting	40	18	18
194	Birtle	50	10	25
211	Bismarck	55	10	11
193	Baldur	40	18	19
148	Belmont	40	18	20
51	Barnesley	21	18	11
86	Beausjour	30	10	11
192	Boissevain	50	10	24
16	Cartier	15	10	10
85	Caray	15	10	11
95	Cypress River	37	18	15
245	Church Bridge	60	10	20
40	Culross	15	10	11
140	Carroll	40	18	19
47	Curtis Siding	10	18	11
173	Deleau	45	10	28
23	Dufresne	15	10	10
40	Dufrost	15	10	11
95	Darlingford	37	18	15
121	Douglas	35	18	16
81	Eli	15	10	11
86	Emerson	31	18	12
86	Eustache	15	10	11
176	Findlay	50	10	23
84	Fannystelle	15	10	11
201	Foxwarren	50	10	23
215	Gruber	55	10	27
130	Glenella	35	18	17
104	Glenboro	35	18	16
137	Greenway	40	18	18
19	Glenlee	15	10	10
18	Headingley	15	10	10
181	Hilton	45	18	21
174	Hartney	45	18	23
224	Harrowby	55	18	28
80	Keyes	37	18	15
179	Kelso	45	18	23
18	La Salle	15	10	10
40	Labroquerie	15	10	11
149	Laurier	40	18	20
15	Lorette	15	10	10
87	Letellier	31	18	11
113	Lariviere	35	18	17
286	Langenburg	60	10	25
39	Marquette	15	10	11
81	Morden	37	18	14
155	Makinak	45	18	21
230	Millwood	55	10	27
103	Manitou	35	18	16
196	Methven	40	18	18
51	Miami	27	18	14
180	Marionville	35	18	17
285	Manor	60	10	25
141	McCreary	40	18	20
117	Neopawa	35	18	17
155	Newdale	45	18	21
156	Ninette	45	18	21
191	Nesbitt	40	18	19
99	Niverville	15	10	10
31	Ottarburne	15	10	11
163	Oak Lake	45	18	22
46	Oakville	15	10	11
101	Ogilvie	35	18	10
56	P. la Prairie	21	18	11
182	Pipetstone	50	10	24
107	Piumas	35	18	16
40	Poplar Point	15	10	11
85	Reaburn	15	10	11
190	Roston	50	10	24
67	Roland	31	18	12
75	Rosebank	31	18	12
108	Somerses	35	18	14
35	Steinback	15	10	11
25	Starbuck	15	10	11
13	Stonewall	15	10	11
28	Selkirk	15	10	10
185	Snowflake	40	18	19
88	Sinnet Siding	15	10	11
195	Solagirth	50	10	24
21	E. Selkirk	15	10	10
195	Sinclair	50	10	24
112	Stockton	55	18	27
271	Shoal Lake	45	18	27
19	St. Anne	15	10	11
40	St. Claude	31	18	11
47	St. Jean	15	10	11
24	St. Agathe	15	10	10
4	St. James	15	10	10
80	Toulon	15	10	10
77	Treherne	37	18	19
26	Union Point	15	10	11
95	Willow Range	15	10	11
31	White Plains	15	10	11
161	Wawanesa	45	18	21
75	Westbourne	31	18	12
40	Woodside	37	18	14
285	Waukegan	55	10	27

SCHEDULE II.

SCHEDULE OF CREAM TRANSPORTATION RATES

From various stations in Manitoba to Winnipeg, and showing the Rates for corresponding distances in the Provinces of Ontario and Quebec, and in the United States.

8 gallon cans.

Distance Miles	Shipping Station.	Present Manitoba Rates.	Ontario and Quebec	U. S. A. Chicago and St. Paul.
48	Arnaud	30	17	15
108	Arden	35	17	15
138	Banting	40	17	15
194	Birtle	50	17	15
211	Bismarck	55	17	15
193	Baldur	40	17	15
148	Belmont	40	17	15
51	Barnesley	30	15	15
86	Beausjour	30	15	15
192	Boissevain	50	15	15
16	Cartier	30	9	12
85	Caray	30	9	12
95	Cypress River	30	24	25
245	Church Bridge	60	17	15
40	Culross	30	17	15
140	Carroll	40	22	25
47	Curtis Siding	30	20	15
173	Deleau	45	22	25
23	Dufresne	30	12	15
40	Dufrost	30	12	15
95	Darlingford	30	24	25
121	Douglas	35	26	25
81	Eli	30	13	15
86	Emerson	35	26	25
86	Eustache	30	15	15
176	Findlay	60	22	25
84	Fannystelle	30	15	15
201	Foxwarren	50	26	25
215	Gruber	55	26	25
130	Glenella	35	26	25
104	Glenboro	35	26	25
137	Greenway	40	33	35
19	Glenlee	30	9	15
18	Headingley	30	9	15
181	Hilton	45	18	15
174	Hartney	45	18	15
224	Harrowby	55	20	25
80	Keyes	30	20	25
179	Kelso	45	15	15
18	La Salle	30	15	15
40	Labroquerie	30	15	15
149	Laurier	40	20	25
15	Lorette	30	15	15
87	Letellier	35	20	25
113	Lariviere	35	20	25
286	Langenburg	60	20	25
39	Marquette	30	15	15
81	Morden	30	15	15
155	Makinak	45	20	25
230	Millwood	55	20	25
103	Manitou	35	20	25
196	Methven	40	20	25
51	Miami	30	20	25
180	Marionville	35	20	25
285	Manor	60	20	25
141	McCreary	40	20	25
117	Neopawa	35	20	25
155	Newdale	45	20	25
156	Ninette	45	20	25
191	Nesbitt	40	20	25
99	Niverville	30	15	15
31	Ottarburne	30	15	15
163	Oak Lake	45	20	25
46	Oakville	30	20	25
101	Ogilvie	35	20	25
56	P. la Prairie	25	20	25
182	Pipetstone	50	20	25
107	Piumas	35	20	25
40	Poplar Point	30	15	15
85	Reaburn	30	15	15
190	Roston	50	20	25
67	Roland	35	20	25
75	Rosebank	35	20	25
108	Somerses	35	20	25
35	Steinback	30	15	15
25	Starbuck	30	15	15
13	Stonewall	30	15	15
28	Selkirk	30	15	15
185	Snowflake	40	20	25
88	Sinnet Siding	30	15	15
195	Solagirth	50	20	25
21	E. Selkirk	30	15	15
195	Sinclair	50	20	25
112	Stockton	55	20	25
271	Shoal Lake	45	20	25
19	St. Anne	15	17	15
40	St. Claude	30	17	15
47	St. Jean	15	17	15
24	St. Agathe	15	17	15
4	St. James	15	17	15
80	Toulon	15	17	15
77	Treherne	37	22	25
26	Union Point	15	17	15
95	Willow Range	15	17	15
31	White Plains	15	17	15
161	Wawanesa	45	20	25
75	Westbourne	31	20	25
40	Woodside	37	20	25
285	Waukegan	55	20	25

SCHEDULE III.

SCHEDULE OF CREAM TRANSPORTATION RATES

From various shipping stations in Manitoba to Winnipeg, and showing the Rates for corresponding distances in the Provinces of Ontario and Quebec, and in the United States, also showing the Manitoba rates previously in force.

10 gallon cans.

Distance Miles	Shipping Station.	Present Manitoba Rates.	Ontario and Quebec	U. S. A. Chicago and St. Paul.	Old Manitoba Rates.
48	Arnaud	35	25	31	30
108	Arden	35	25	32	30
138	Banting	40	25	32	30
194	Birtle	50	19	40	30
211	Bismarck	55	19	21	30
193	Baldur	40	25	37	30
148	Belmont	40	25	39	30
51	Barnesley	30	25	22	30
86	Beausjour	25	19	21	30
192	Boissevain	50	19	47	30
16	Cartier	30	19	20	30
85	Caray Siding	35	19	21	30
95	Cypress River	80	25	30	30
245	Church Bridge	60	19	22	30
40	Culross	35	19	21	30
140	Carroll	40	25	34	30
47	Curtis Siding	25	25	24	30
173	Deleau	45	19	24	30
23	Dufresne	30	19	20	30
40	Dufrost	25	19	21	30
95	Darlingford	80	25	30	30
121	Douglas	35	25	35	30
81	Eli	25	19	21	30
86	Emerson	30	25	24	30
86	Eustache	25	19	21	30
176	Findlay	50	19	20	30
84	Fannystelle	25	19	21	30
201	Foxwarren	55	25	33	30
215	Gruber	55	25	34	30
130	Glenella	35	25	32	30
104	Glenboro	35	25	32	30
137	Greenway	40	25	36	30
19	Glenlee	30	19	20	30
18	Headingley	30	19	20	30
181	Hilton	45	44	28	30
174	Hartney	45	44	28	30
224	Harrowby	55	44	28	30
80	Keyes	30	44	28	30
179	Kelso	45	44	28	30
18	La Salle	30	19	20	30
40	Labroquerie	25	19	21	30
149	Laurier	40	25	30	30
15	Lorette	30	19	20	30
87	Letellier	30	25	22	30
113	Lariviere	35	25	23	30
286	Langenburg	60	25	31	30
39	Marquette	15	19	16	30
81	Morden	30	25	26	30
155	Makinak	45	43	28	30
230	Millwood	55	43	31	30
103	Manitou	35	25	26	30
196	Methven	40	25	27	30
51	Miami	30	25	24	30
180	Marionville	35	25	27	30
285	Manor	60	25	30	30
141	McCreary	40	25	28	30
117	Neopawa	35	25	28	30
155	Newdale	45	25	31	30
156	Ninette	45	25	31	30
191	Nesbitt	40	25	28	30
99	Niverville	30	19	20	30
31	Ottarburne	30	19	20	30
163	Oak Lake	45	25	31	30
46	Oakville	35	25	28	30
101	Ogilvie	30	25	28	30
56	P. la Prairie	25	25	27	30
182	Pipetstone	50	25	30	30
107	Piumas	35	19	21	30
40	Poplar Point	25	19	21	3